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ABSTRACT

Two rating instruments for evaluating the performance of men in Navy jobs by supervisors were developed based on the need to know how effectively men of varying ability perform different tasks. Specific Navy jobs were selected for the development of the performance instruments according to the following job factors: Highly populated, representation of different job characteristics, likelihood of common tasks across billets, representation of low aptitudes, and availability of Navy Occupational Task Analysis Program (NOTAP) data. The resulting two instruments developed were the Performance Analysis Inventory (PAI) and the Task Proficiency Inventory (TPI). The PAI analyzes performance in terms of worker-oriented variables and is based upon job analyses using a modification of McCormick's "Position Analysis Questionnaire." The TPI analyzes performance in terms of job-oriented variables and is based upon job analyses conducted by the Navy Occupational Task Analysis Program. Within the limitations of a comparison of experimental and operational data, both the PAI and TPI show less leniency and halo effects, and better discrimination than the Performance Evaluation Report used in the Navy. Both experimental instruments will be used in subsequent research on the performance of men in different mental categories. (Author/HD)

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PERFORMANCE OF MEN IN DIFFERENT MENTAL CATEGORIES:

1. Development of Worker-Oriented and Job-Oriented Rating Instruments in Navy Jobs

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Two rating instruments for evaluating the performance of men in Navy jobs were developed. These are the Performance Analysis Inventory (PAI) and the Task Proficiency Inventory (TIP). The PAI analyzes performance in terms of worker-oriented variables and is based upon job analyses using a modification of McCormick's *Position Analysis Questionnaire*. The TPI analyzes performance in terms of job-oriented variables and is based upon job analyses conducted by the Navy Occupational Task Analysis Program. Within the limitations of a comparison of experimental and operational (continued)

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data, both the PAI and TPI show less leniency and halo effects, and better discrimination than the Performance Evaluation Report used in the Navy. Both experimental instruments will be used in subsequent research on the performance of men in different mental categories.

SUMMARY

How effectively do men of varying ability perform different kinds of tasks? No systematic body of information exists that can be used to answer this question when it is applied to particular jobs. A study was undertaken to develop a catalogue of information about the characteristics of selected jobs and tasks that are associated with effective and ineffective performance by men of different mental abilities. The first phase of this research was devoted to the development of supervisor rating instruments that could be used to evaluate a man's performance on each of the important elements and tasks of a job.

The Navy jobs selected as vehicles for this research were: Aviation Boatswain's Mate-Equipment, Aviation Boatswain's Mate-Fuel, Aviation Boatswain's Mate-Handler, Aviation Ordnance, Electrician's Mate, Hull Mainterence Technician, Interior Communications, Mess Management Specialist-S2 Division, Mess Management Specialist-S5 Division, and Storekeeper.

Two rating instruments for evaluating the performance of men in these jobs were developed. They are the Performance Analysis Inventory (PAI) and the Task Proficiency Inventory (TPI). The PAI analyzes performance in terms of worker-oriented variables that focus on human behavior that generalize across tasks. It is based upon job analyses using a modification of McCormick's *Position Analysis Questionnaire*. The TPI analyzes performance in terms of job-oriented variables and focuses on specific job content. It is based upon job analyses conducted by the Navy Occupational Task Analysis Program. Within the limitations of a comparison of experimental and operational data, both the PAI and TPI show less leniency and halo effect, and better discrimination, than the Performance Evaluation Report used in the Navy. The PAI appears to possess slightly more promising characteristics than the TPI.

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INTRODUCTION

Background

This study was undertaken to develop a catalogue of information about the characteristics of selected jobs and tasks that are associated with effective and ineffective performance by men of different mental abilities. The research is in two phases. The first phase, the subject of this report, was devoted to the development of supervisor rating instruments that could be used to evaluate a man's performance on each of the important elements and tasks of a job. The second phase will involve the use of these instruments in assessing the performance of men of different mental abilities in a variety of Navy jobs.[1]

How effectively do men of varying ability, particularly men of lower aptitude, generally perform in military occupations? How do they perform different kinds of tasks? While these questions are asked periodically by military manpower planners and managers, no systematic body of information yet exists that can be used to develop answers when these questions are applied to particular jobs.

At present, with an All-Volunteer Force and a general restriction or shifting of the bulk of enlisted military personnel into the middle and lower ranges of mental aptitude, questions about the effectiveness and job flexibility of men in these areas of the aptitude distribution have again come to the fore.

It is known, of course, that for a variety of reasons, aptitude test scores are not perfectly related to actual performance in a job and that many men, even at lower levels of aptitude do perform effectively. This is so for a variety of reasons. First, although aptitude tests have generally been validated on, and therefore best predict, the relative success of men in training or classroom situations, the characteristics that contribute to a man's success in a classroom are often of lesser importance when he reaches a job. Second, reading and verbal ability, fairly well predicted by aptitude tests, typically play a major role in conventional instructional situations, particularly as these literacy skills facilitate the understanding and assimilation of information and contribute to success in written examinations. Motivational and attitudinal factors, not predicted by aptitude tests, frequently emerge as more important determinants of job effectiveness than verbal ability or even technical proficiency itself. Third, aptitude test scores, while devised to measure a man's intrinsic ability, are highly influenced by an individual's prior educational, cultural, and social experiences and opportunities. The less often a person has been exposed to the kinds of materials upon which the test items are based — indeed, the less familiarity he has with taking tests themselves — the more likely he is to make a low score.

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[1] In the Navy, the term rating is used to refer to an occupational specialty or to closely related jobs. Since this report deals with the use of rating instruments to evaluate job performance, the use of the term rating to refer to both jobs and instruments would inevitably create confusion. The term Navy jobs is used hereafter to refer to what would ordinarily be called Navy ratings.

A number of recent studies have shown that men with lower aptitude scores often perform effectively both during training and on the job. For example, Weingarten, Hungerland, and Brennan (8), developed a new model of training based on instruction by peers and applied it to the various clusters of tasks performed by Army Field Wiremen: Field Wire Installation, Switchboard Installation and Operation, and Document Distribution and Radio Monitoring. On performance tests after such training, all men at lower levels of mental aptitude attained the 100 percent criterion that had been established for graduation from the course.[2]

Vineberg and Taylor (7), compared the performance of men in different aptitude groupings who were assigned to duty in four different Army jobs — Armor Crewman, Vehicle Repairman, Supply Specialist, and Cook. Performance in each job was assessed primarily through the intensive use of objectively scored job sample tests constructed of representative tasks taken from each job. Such tests were individually administered to approximately 400 men in each job and, depending on the job, the test took from three to five hours for a man to complete. Although the average performance of the different aptitude groups showed differences in these job sample tests, the distributions of test scores showed extensive overlap. Furthermore, a considerable number of men with lower aptitude scores performed at or above an acceptable level of job performance (a level defined by the performance of men with more than thirty months of experience on the job who had been eligible to re-enlist in the Army one or more times).

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[2] N = 23, 14, & 20 for the three clusters of tasks.

Even though these studies showed clearly that men of lower aptitude can perform *effectively* in a restricted set of military jobs, they did not show that such men would be *equivalent* to men of higher aptitude on specific tasks if a completely unrestricted range of tasks were under consideration. Men of lower aptitude may need more time to learn certain tasks, they may show more efficient learning with different training methods, or they may display average, but perhaps rarely above average proficiency in performing particular tasks on the job.

In the study by Weingarten et al, for example, men in lower mental categories reached mastery in Field Wire Installation in the same length of time as men in higher mental categories, but they needed slightly *more* time to reach mastery in the other three tasks: Switchboard Installation and Operation, Document Distribution, and Radio Monitoring. In the Vineberg and Taylor study, the *average* differences in performance between higher and lower aptitude groups varied with certain characteristics of the tasks. When the *difficulty* of a task was defined empirically, the differences in performance between the various aptitude groups increased with task difficulty.

Despite such studies, our understanding of how men of varying aptitude perform remains fragmentary. Application of the limited information that exists can be made only in terms of individual judgments based on personal or unspecified criteria. Clearly, a more comprehensive body of information is needed in order to estimate the proficiency of men of differing aptitudes in different types of jobs and in different types of tasks within these jobs.

Two Approaches to Analyzing Jobs

McCormick et al (4) has distinguished between two approaches that have been used to describe and analyze jobs. A job can be characterized either in terms of job-oriented elements or worker-oriented elements.

> "Job-oriented elements are descriptions of job content that have a dominant association with, and typically characterize, the 'Technological' aspects of jobs and commonly reflect what is achieved by the worker. On the other hand, worker-oriented elements are those that tend more to characterize the generalized human behaviors involved; if not directly, then by strong inference."

Some examples of job-oriented elements are: repair carburetors, draft business letters, grind meat, supervise training, anneal copper tubing, prepare accident reports, drive pick-up truck, organize stock control functions, and translate Russian newspaper articles. Some examples of worker-oriented elements are: obtain information from written materials, observe visual displays, observe actions of people, judge condition or quality, estimate quantity, analyze information, use non-precision tools, activate variable setting controls, negotiate with people, exchange routine information, follow fixed procedures, use keyboard devices.

When a detailed analysis of job performance is to be made, either of these modes of classifying the components of the job has something to recommend it. Job-oriented descriptions refer to particular tasks, equipment, or products of performance. They generally provide an easily understood and unambiguous statement of a directly observable and quite specific aspect of a job. Thus, there is little likelihood of misunderstanding the particular aspect of performance that is to be evaluated.

Worker-oriented descriptions, on the other hand, refer to human behaviors or other aspects of work that are less specific. Since these descriptions are general to many situations, one of their virtues is that they provide a possible basis for making inferences from one job or task to another; i.e., they may permit generalizations to be made from data about performance in particular jobs and tasks to other situations that have not been studied. Also, worker-oriented descriptions lend themselves more readily to the inclusion of descriptors that refer to motivational, attitudinal, and stylistic (e.g., carefulness, persistence) characteristics.

In this study, both worker-oriented and job-oriented performance rating instruments were developed.

SELECTION OF NAVY JOBS FOR THE STUDY

Specimen Navy jobs were selected for the development of the performance evaluation instruments (Phase I). These same Navy jobs will be used in assessing the performance of men at different aptitude levels (Phase II). The following factors were considered in selecting the jobs:

1. Highly Populated Jobs — Each Navy job was to have a relatively high density so as to provide an adequate sample of men for the study. Since the instruments were to be tailored to each job, this would increase their practical use if they were later adopted for operational purposes. It would also increase the practical use of specific findings.
2. Representation of Different Job Characteristics — The Navy jobs, taken together, should cover as broad a range as possible of types of jobs and tasks.
3. Likelihood of Common Tasks Across Billets — Since inevitably, it would be necessary to sample from different billets (specific duty assignments) in each Navy job in order to obtain a sufficiently large sample, it was desirable to select jobs in which there would be some degree of common tasks shared across billets.
4. Representation of Low Aptitudes — Without reducing the range of tasks covered, Navy jobs were to be selected in which reasonably large numbers of lower aptitude men are assigned. This would increase the likelihood that a sufficient and representative sample of lower aptitude men could be obtained for Phase II of the study.
5. Availability of NOTAP Data — Task inventory data from the Navy Occupational Task Analysis Program (NOTAP) was to be used in constructing the job-oriented performance rating instruments. Thus, it was necessary to insure that NOTAP data would be available for at least some of the Navy jobs selected.

Information about these criteria, as applied to various Navy jobs, was obtained from representatives of the Naval Training Center (San Diego), the Naval Education and Training Command, and the technical director of NOTAP. The following Navy jobs were selected. (Asterisks indicate the availability of NOTAP data.)

- Aviation Boatswain's Mate
  - Equipment (ABE)*
  - Fuel (ABF)*
  - Handling (ABH)*
- Aviation Ordnance (AO)*
- Electrician's Mate (EM)
- Hull Maintenance Technician (HT)
- Interior Communication (IC)
- Mess Management Specialist
  - (MS-S2 Division)*
  - (MS-S5 Division)*
- Storekeeper (SK)*

DEVELOPMENT OF THE WORKER-ORIENTED INSTRUMENT

Work began on the development of the worker-oriented instrument, the Performance Analysis Inventory (PAI), with the identification of frequently occurring or important behavioral elements in each of the selected Navy jobs. Job analysis data were obtained by administering a modified form of the Position Analysis Questionnaire (PAQ) (3) to a minimum of five experienced job incumbents in each Navy job or job subdivision (e.g., ABE, ABF, ABH).

The PAQ is a structured job analysis questionnaire consisting of 194 possible worker-oriented job elements. These elements describe sources of job information, mental processes involved in job performance, and responses or modes of work output. Other elements cover interpersonal activities, the job context, and a variety of miscellaneous aspects of work.

A job is analyzed by rating the relevance or importance of each possible element to the job in question. The scale dimensions vary depending upon the characteristics of the element (for example, "extent of use", "amount of time", "importance to the job", etc.).

The modified form of the PAQ used in this study was based upon a version developed by Pritchard and Peters (5) for use with Navy personnel. In their version, some of the job elements had been deleted that would be inappropriate for analyzing Navy jobs (e.g., specification of salary level, description of type of clothing that is worn). In the version developed for the present study, the format of the PAQ was reorganized to provide an ordering of items that would facilitate understanding and be more appropriate for a superior to consider in rating the performance of a subordinate. For example, in the modified form, questions about the importance or frequency of occurrence of work output variables are presented first. They tend to reflect more concrete aspects of a job than the initial set of questions, as found in the Pritchard and Peters version, about sources of job information or information processing activities. The final version consisted of 139 worker-oriented elements. A copy is provided in Appendix A.

The elements that were described in the analysis as being at least of average importance or frequency were identified for each Navy job. The number of elements that emerged for each job are shown in Table 1. As will be described subsequently, these elements formed the basis for the construction of the worker-oriented performance rating instruments.

In independent factor analyses of its separate sections, Marquardt and McCormick (2) identified 31 behavioral and situational dimensions that underlie the worker-oriented elements of the PAQ. The elements that were included in the modified version of the PAQ used in this study contributed to 26 of these dimensions. All of these dimensions were represented in the elements that emerged in the job analyses as being of at least "average" importance or frequency.[3] Thus, the Navy jobs selected for the study appeared to provide a reasonably broad coverage of possible behavioral and situational demands.

Examples of specific tasks were then obtained from job incumbents for each of the elements that had emerged from the job analyses. For example, the item, "Using energy-powered non-precision tools" was found to be important in several jobs. In the ABE job, examples involved the use of welding equipment and brazing gear; in the ABH job, spray guns and the KDC machine; in the AO job, air drills

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[3] See Appendix B for dimension titles.

TABLE 1. NUMBER OF ELEMENTS RATED AT LEAST "AVERAGE" AND MEAN RATING OF THESE ELEMENTS FOR EACH NAVY JOB.

NAVY JOB	N	MEAN RATING*
Aviation Boatswain's Mate		
Equipment (ABE)	74	3.96
Fuel (ABF)	45	3.67
Handling (ABH)	57	3.91
Aviation Ordnance (AO)	41	3.54
Electrician's Mate (EM)	62	3.74
Hull Maintenance Technician (HT)	56	3.73
Interior Communication (IC)	42	3.69
Mess Management Specialist		
(MS-S2 Division)	33	3.50
(MS-S5 Division)	38	3.70
Storekeeper (SK)	34	3.67

---

*Scale range, 0-5.

and air socket guns, etc. Following the gathering of these examples, elements were translated into items suitable for rating performance (rather than job structure) and the examples were coupled to the elements. During this step the wording of some items was simplified. Also at this stage, a few elements that had not been covered in the PAQ were added and a few that had been a part of the job analysis form were deleted. For example, the element "interacting with co-workers" is not contained in the PAQ but was believed to be appropriate and so was added. The element "body movement sensing" was deleted because it was felt that it would be difficult to evaluate and most raters would not be able to distinguish it from a similar element, "balancing". See Table 2 for the final number of worker-oriented elements selected for each rating.

Using this translation two forms of performance rating instruments were developed. The first used a common scale for rating an incumbent's performance regardless of the behavioral element that was being evaluated, i.e., any element of performance was rated on a seven point scale ranging from "Among the very best I have ever seen " to "Among the very worst I have ever seen".

The second instrument varied in the definition of the scale depending upon the behavioral element that was being considered. For example, in evaluating performance in the use of key board devices, behavior was scaled in terms of speed and number of errors; in evaluating performance of tasks requiring fixed procedures, behavior was scaled in terms of the frequency of departure from procedures; in evaluating performance requiring estimates of time to complete a task, behavior was scaled in terms of the thoughtfulness and accuracy of the estimate.

In both varieties of the worker-oriented instrument, provision is made for noting that the person rated may never have to perform the task in his present billet. Samples of the multiple scale and common scale forms are contained in Appendix C.

TABLE 2. NUMBER OF ITEMS IN THE TASK PROFICIENCY INVENTORY (TPI) & THE PERFORMANCE ANALYSIS INVENTORY (PAI) BY NAVY JOB & PAY GRADE.

NAVY JOB*	TPI			PAI
	E3	E4	E5	
ABE	—	40	63	56
ABF	—	40	50	49
ABH	—	40	50	56
AO	54	40	51	45
EM	—	—	—	50
HT	—	—	—	47
IC	—	—	—	49
MS-S2 DIV	54	40	56	39
MS-S5 DIV	93	68	86	38
SK	56	40	61	34

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*See Table 1 for full title.

The PAI items were classified into five catagories some of which were similar to the divisions used by McCormick et al in the Position Analysis Questionnaire. These catagories are:

I. Use Of Tools & Equipment
II. Hand/Arm Manipulation
III. Coordination
IV. Work Habits & Processes
V. Obtaining & Observing Job Relevant Information

Also 23 of the PAI items appeared in the rating instruments for all of the Navy jobs. These 23 items will be referred to as common items.

A matrix of PAI items appears in Appendix D. It identifies the sections of the PAI, an abbreviated version of the items in each section, the common items, and the number of the item for the form used in the different Navy jobs.

DEVELOPMENT OF THE JOB-ORIENTED INSTRUMENT

As indicated earlier, the job-oriented rating instruments, the Task Proficiency Inventory (TPI), were based upon task inventory data furnished by NOTAP. Data were obtained for tasks performed by men in E3-E5 pay grades in billets on aircraft carriers.[4]

Tasks were ordered by the percent of members of the NOTAP survey sample who reported they performed the task in their present assignment. As would be expected, the E4 sample of tasks had the greatest overlap with the E3 and E5 task lists. Consequently the first forty tasks of the E4 list were selected to be used both for the evaluation of E4 personnel and to form the first forty items of the rating forms for E3 and E5 personnel. These last two forms were then supplemented by including tasks among the first forty in their respective lists that had not appeared among the first forty in the E4 list. This procedure produced forms of the TPI for each Navy job (for which NOTAP data were available) and each pay grade containing the number of items as shown in Table 2. The table also shows the final number of elements in the worker-oriented rating forms. These numbers differ somewhat from those shown in Table 1 as a result of the refinements described above.

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[4] In Phase II performance evaluations will be obtained for job incumbents aboard aircraft carriers in order to maximize the amount of data that can be collected.

NOTAP data did not differentiate between Aviation Boatswain's Mate - Equipment, Handling, and Fuel at the E3 level. Consquently, in these jobs E4 forms were used for E3.

In writing the actual items, the task titles of the NOTAP lists were modified only by changing verbs to gerunds. For example "hook tow bars to aircraft" became "hooking tow bars to aircraft." Again a seven point scale was used in which the performance of a task was rated from "Very Effective," to "Very Ineffective." Provision was again made for noting that the person being rated "never has to" perform the task in his present billet. Sample copies of the TPI are provided in Appendix C.

DATA COLLECTION

Purpose

Following the development of the two forms of the PAI and the TPI these instruments were administered in the fleet. The resulting data was intended to serve three purposes:

1. Provide a basis for selection of either the common scale or multiple scale version of the PAI.
2. Determine the psychometric characteristics of the instruments and provide for a comparison with the Performance Evaluation Report (PER), the rating instrument used operationally in the Navy.
3. Provide information for an item analysis in order to identify those items for the final forms of the instruments to be used in Phase II of the study.

General Procedure

Field trials of the instruments were conducted aboard the USS Enterprise and USS Constellation during May and June 1976. On each ship samples of available job incumbents in each of the ten Navy jobs were identified. These are best described as samples of convenience, since no attempt was made at randomization or stratification by grade. Simply, the names of all available men in pay grade E3-E5 in the jobs were requested. Next, supervisors of men in the sample were identified. Supervisors were scheduled separately for each job and reported to a quiet location, e.g. Ready Room, for administration of the rating instruments. They were briefed on the purpose of the study and told that the evaluations they were about to provide would be used solely for research purposes and would not effect the ratees in any way.

The PAI and the TPI were administered in a counter balanced order. Each supervisor evaluated three to five job incumbents. Each instrument required approximately 15 to 20 minutes to complete. All administration sessions were monitored by the research staff. The most recent marks on the PER were obtained for the ratees from personnel files.

Sample Size

Performance evaluation data, using the PAI and the TPI, was obtained for a total of 569 job incumbents in the ten Navy jobs. The sample is displayed in Table 3.

Pilot Study To Select Common Or Multiple Scale For The PAI

Prior to gathering the bulk of the data, a small pilot study was undertaken to select either the common or multiple scale version of the PAI for use in the remainder of the data collection (see page 9 for a description of the scales and Appendix C for samples of both). To retain both forms of the PAI would require supervisors in seven of the Navy jobs to complete three rating instruments for each incumbent. This would be a rather lengthy task and might lead to deterioration in the quality of the information obtained.

Thirty-six men in the EM, HT, and IC jobs were evaluated by their supervisors using both the multiple and common scale forms of the PAI. Forms were completed in a counterbalanced order.

The frequency of mean ratings for men evaluated with the common scale and with the multiple scale is shown below.

MEAN RATING	FREQUENCY	
	Common	Multiple
6.6-6.8	1	2
6.1-6.5	3	2
5.6-6.0	2	4
5.1-5.5	3	7
4.6-5.0	9	2
4.1-4.5	8	6
3.6-4.0	8	7
3.1-3.5	1	4
2.6-3.0	1	1
2.1-2.5		1

TABLE 3. SAMPLE SIZE BY SHIP, NAVY JOB, AND PAY GRADE.

NAVY JOB	USS ENTERPRISE			USS CONSTELLATION			TOTAL
	E3	E4	E5	E3	E4	E5	
ABE	22	17	8	24	5	1	77
ABF	16	24	6	7	4	2	59
ABH	13	17	2	29	13	1	75
AO	26	26	5	11	10	0	78
EM	6	7	2	11	24	8	58
HT	5	3	0	14	21	2	45
IC	4	5	0	4	10	3	26
MS-S2 DIV	10	15	8	10	8	3	54
MS-S5 DIV	24	10	10	9	2	7	62
SK	4	10	4	6	8	3	35
							569

This distribution shows a slightly greater range of scores for the multiple scale forms. Based upon this, the data for each of the other seven Navy jobs and the remaining data for EM, HT, and IC were collected using only the multiple scale version of the PAI.

DATA ANALYSIS AND DISCUSSION

Preliminary Data Processing

Prior to further analysis, the percent response for each item on the two experimental instruments was examined. Items that failed to receive at least a 50 percent response (that is, items for which more of the responses were "never has to") were deleted.

Deletion of items effected the PAI very little, with between zero to three items being removed in each Navy job. This suggests that the job analysis performed earlier during the construction of the PAI had produced reasonably reliable job information.

For the TPI, between 1-17 items were deleted across the first 40 items that were common to all pay grades within each job. Since the NOTAP job analysis upon which the TPI is based are intended to be quite task specific, this higher rate of discard is not surprising. Though the NOTAP data requested for this study was restricted to jobs on aircraft carriers, such jobs still include a large number of billets involving somewhat different tasks.

An analysis was also undertaken to determine the contribution of the NOTAP items that were added to the E3 and E5 forms beyond the first 40 items common to all three pay grades. The percent frequency distributions of mean ratings for the first 40 items were compared with those for all items and were found to be virtually identical. As a consequence, data are reported in the remainder of the report for the first 40 items on the TPI.

Characteristics Of Instruments

Three major types of bias are generally considered when rating instruments are being evaluated: halo, errors of leniency, and errors of central tendency (1,6).

Halo refers to the tendency of raters to allow their general impression of a man to influence their evaluation of his individual traits or characteristics of performance. While many aspects of job performance are correlated and some degree of halo is valid, there is general agreement that there should be differentiation in the rating of a person's performance across different tasks.

Errors of leniency refer to the tendency of raters to assign ratings at the favorable end of a scale. Errors of central tendency refer to the inclination to assign ratings at the middle of a scale. A variety of personal, administrative, and other pressures tend to promote leniency. Central tendency can occur for similar reasons or because scale meanings are unclear or because the performance being evaluated is not well known to the rater. It is virtually impossible either to eliminate leniency and central tendency or to tease out their seperate effects. If ratings are to be used as the only practical method for evaluating large numbers of persons, the best that can be done is to attempt to keep these sources of error to a minimum.

Table 4 shows the means and standard diviations of ratings on the PAI, TPI, and PER by pay grades and Navy job, and for pay grades combined. Each person's mean rating on a given instrument was obtained and used as a score to compute the group means and standard deviations.

In the E5 groups, the number of cases is small in many instances. Standard deviations and means were not reported for n less than four and n less than three respectively. Three cases with an n of four have been analyzed as all other data simply for the sake of completeness. Nevertheless, it will be seen that the data remain quite consistant.

TABLE 4. MEANS & STANDARD DEVIATIONS OF SUBJECT MEANS ON THREE RATING INSTRUMENTS.

	MEAN			STANDARD DEVIATION			N		Raw
			Converted				PAI &	N	PER
E3	PAI	TPI	PER	PAI	TPI	PER	TPI	PER	Mean
ABE	4.44	4.71	5.05	1.29	1.26	.94	46	29	3.42
ABF	4.13	4.35	5.35	1.23	1.13	.68	23	13	3.51
ABH	4.64	4.97	5.22	1.18	1.04	1.06	42	33	3.47
AO	4.30	4.77	5.28	1.52	1.37	.83	37	24	3.49
EM	4.36	—	4.94	1.00	—	1.19	17	13	3.35
HT	4.29	—	5.78	1.28	—	.66	19	9	3.63
IC	4.73	—	5.39	.75	—	.33	8	6	3.52
MS-S2	3.47	3.82	4.86	1.22	1.29	1.20	20	12	3.36
MS-S5	4.29	4.56	5.38	1.33	1.34	.90	33	17	3.52
SK	4.16	4.63	4.77	1.23	1.03	.88	10	5	3.30
E4									
ABE	5.19	5.25	5.51	.89	.92	.73	22	12	3.55
ABF	5.00	5.14	5.67	.87	.92	.64	28	18	3.60
ABH	5.31	5.31	6.01	1.12	1.12	.45	30	24	3.70
AO	4.87	5.02	5.69	1.29	1.27	.63	36	28	3.61
EM	4.40	—	5.26	1.10	—	.67	31	30	3.48
HT	4.76	—	5.63	.88	—	.94	24	22	3.60
IC	4.45	—	5.30	.99	—	.63	15	13	3.49
MS-S2	5.01	5.12	5.73	1.09	1.03	.64	23	16	3.62
MS-S5	5.51	5.90	6.49	.56	.64	.59	12	8	3.85
SK	5.12	5.66	5.97	.87	.72	.53	18	14	3.69
E5									
ABE	5.45	5.58	6.50	.99	.87	NC*	9	3	3.89
ABF	5.61	5.74	5.87	.63	.59	.17	8	4	3.66
ABH	5.78	5.86	**	NC	NC	**	3	**	**
AO	6.20	6.14	**	1.00	1.07	**	5	**	**
EM	5.03	—	6.07	.26	—	.58	10	4	3.72
HT	NC	—	NC	NC	—	NC	2	2	NC
IC	4.67	—	NC	NC	—	NC	3	2	NC
MS-S2	5.35	5.54	NC	.85	.86	NC	11	1	NC
MS-S5	6.00	6.26	**	.87	.60	**	17	**	**
SK	5.32	5.73	6.23	1.19	1.09	.61	7	4	3.77
E3-E5									
ABE	4.77	4.96	5.28	1.22	1.16	.94	77	45	3.49
ABF	4.74	4.91	5.57	1.12	1.08	.64	59	35	3.57
ABH	4.95	5.14	5.55	1.19	1.07	.94	75	57	3.57
AO	4.69	4.97	5.51	1.45	1.34	.75	78	52	3.55
EM	4.49	—	5.22	1.00	—	.87	58	48	3.47
HT	4.62	—	5.72	1.05	—	.86	45	34	3.62
IC	4.56	—	5.35	.87	—	.56	26	22	3.51
MS-S2	4.51	4.72	5.36	1.35	1.30	.98	54	29	3.51
MS-S5	5.00	5.28	5.74	1.34	1.32	.96	62	25	3.62
SK	4.89	5.38	5.78	1.12	.99	.81	35	23	3.63
OVERALL	4.73	5.04	5.49	1.23	1.20	.86	PAI 569 TPI 440	370	

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*The number of cases was so low, that the statistic was not computed where NC is shown.

**No data were available.

Table 4 also includes the mean of raw PER scores. The PER (NAVPERS 792[5]), the rating instrument used operationally in the Navy, consists of ten point scales for rating the following five traits: Professional Performance, Military Behavior, Leadership and Supervisory Ability, Military Appearance, and Adaptability. In personnel records, marks on the ten point scales are translated into non-continuous values, ranging from low to high, of 1.0, 2.0, 2.6, 2.8, 3.0, 3.2, 3.4, 3.6, 3.8, and 4.0. To permit statistical comparisons, based on advise from the Navy Personnel Research and Development Center, we treated the values 1.0 and 2.0 as 2.2 and 2.4 respectively. These adjustments did not effect the data greatly since only one instance of scale value 1.0 and seven instances of value 2.0 were encountered across all Navy jobs and pay grades. PER raw score values were converted to make them comparable to the seven point scale values of the PAI and TPI.[6]

Table 5 has been prepared to summarize the display of means in Table 4. Here the number of times a mean on one instrument exceeds another is shown. The higher the mean the greater the leniency.

It will be observed that the PAI shows less leniency than the TPI which in turn shows less leniency than the PER. This relationship is strikingly consistant across all pay grades.

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[5] NAVPERS 1616/18w, a form containing 11 scales, is currently used in the Navy for evaluating the performance of men in pay grades E5 and E6. Only a small part of the small E5 sample were found to have been evaluated with this form. All PER data reported here for men in pay grade E5 is taken from NAVPERS 792.

[6] The formula used to convert PER raw scores was:

$$y = \left[\left(\frac{x - 2.2}{1.8}\right) 6\right] + 1$$

where x = raw PER score

y = converted PER score.

TABLE 5. NUMBER OF TIMES MEANS ON ONE RATING INSTRUMENT EXCEED ANOTHER

	PAI > TPI	PAI > PER	TPI > PER
E3	0/7	0/10	0/7
E4	0/6*	0/10	0/7
E5	1/7	0/7**	0/4**

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*A tie occurred in one comparison.

**PER data were not available for 3 Navy jobs, thus reducing the number of compariosns that could be made between PAI and PER to 7, and between TPI and PER to 4.

TABLE 6. NUMBER OF TIMES STANDARD DEVIATIONS OF MEANS ON ONE RATING INSTRUMENT EXCEED ANOTHER

	PAI > TPI	PAI > PER	TPI > PER
E3	5/7	9/10	6/7
E4	3/6	8/10	7/7
E5	4/6	2/3	2/2

While raters may vary in their general level of leniency or severity in evaluating job performance, this factor has been controlled for the PAI and TPI data. Each supervisor rated each of his subordinates with both of the experimental instruments in a counterbalanced order. It should be recognized that the PER data 1) were based on the ratings of unknown supervisors, and 2) originated in an operational setting. Therefore, differences between the experimental instruments and the PER may be attributable in part to these uncontrolled factors. In addition, the number of PER records available is considerably less than the number of men who were rated with the experimental instruments. PER data were available for 63% of the E3, 77% of the E4, and only 27% of the E5 subjects. This should be recognized for all further comparisons between these instruments.

Table 6 has been prepared to summarize the standard deviations, shown in Table 4. In general, it appears that there is more differentiation across subjects (their means show more dispersion) with the PAI than with either of the other instruments, and with the TPI as compared to the PER. The one equivocal instance is for the E4 group on the PAI - TPI comparison.

Another way of examining the relative leniency of the rating instruments is to consider the frequency of usage of the different scale values for each of the forms. We are confronted here with the problem that the PAI and TPI use seven point scales and the PER uses a ten point scale. The question is how to place the data so that a meaningful relationship between the two scales can be displayed. If the data from either scale is displayed by converting it to the other and then expanded (expressing seven point data on a ten point scale) or compressed (expressing ten point data on a seven point scale) visual distortion arises. Our solution was to set the mid-points of each scale at the same position on the X-axis. Thus, half of the scale values for either scale fall to either side of the mid-points as shown in Figures 1a-1d.[7]

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[7] The data upon which these drawings are based appear in Appendix E, Tables E-1 to E-4.

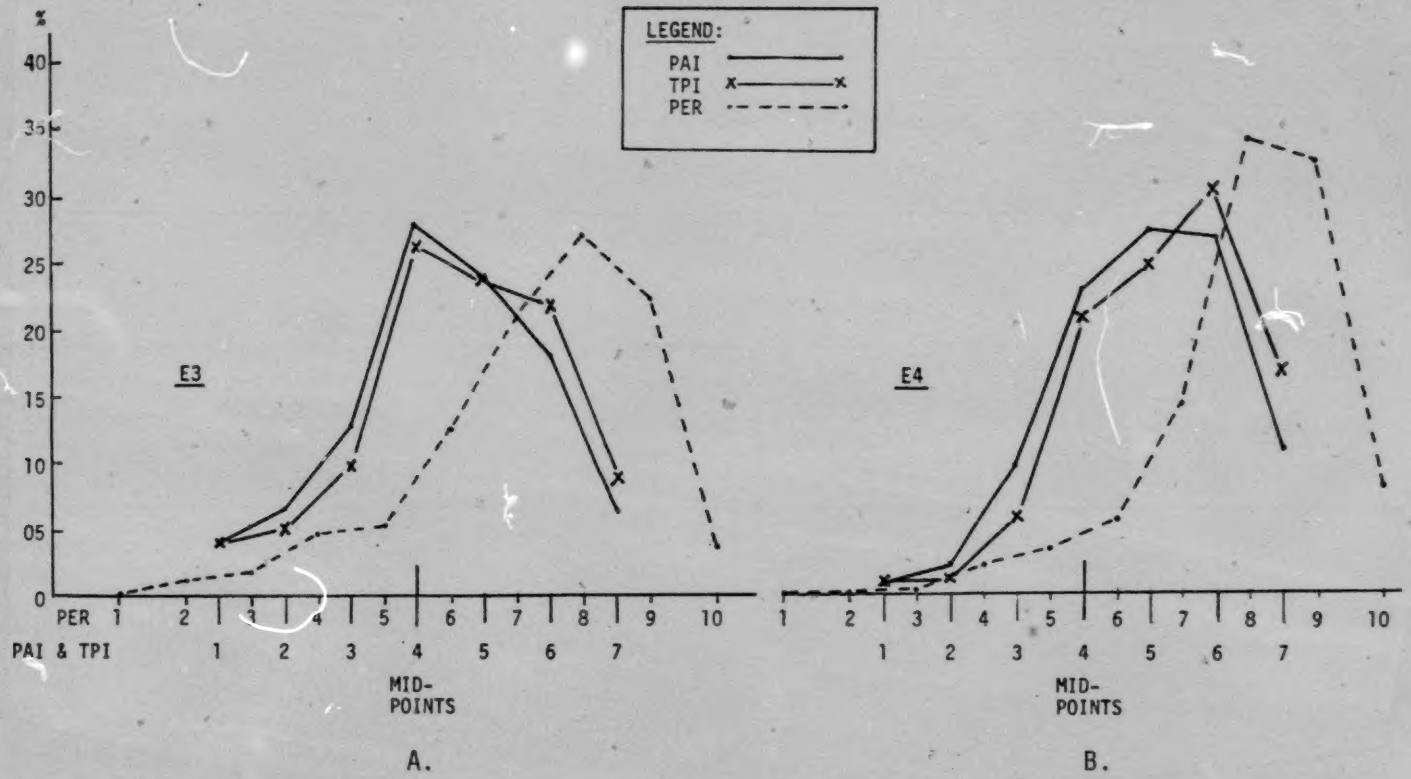

Figure 1. Frequency Distributions (in %) of Scale Value Usage for Three Rating Instruments Drawn with the Mid-Points of Scales Coinciding.

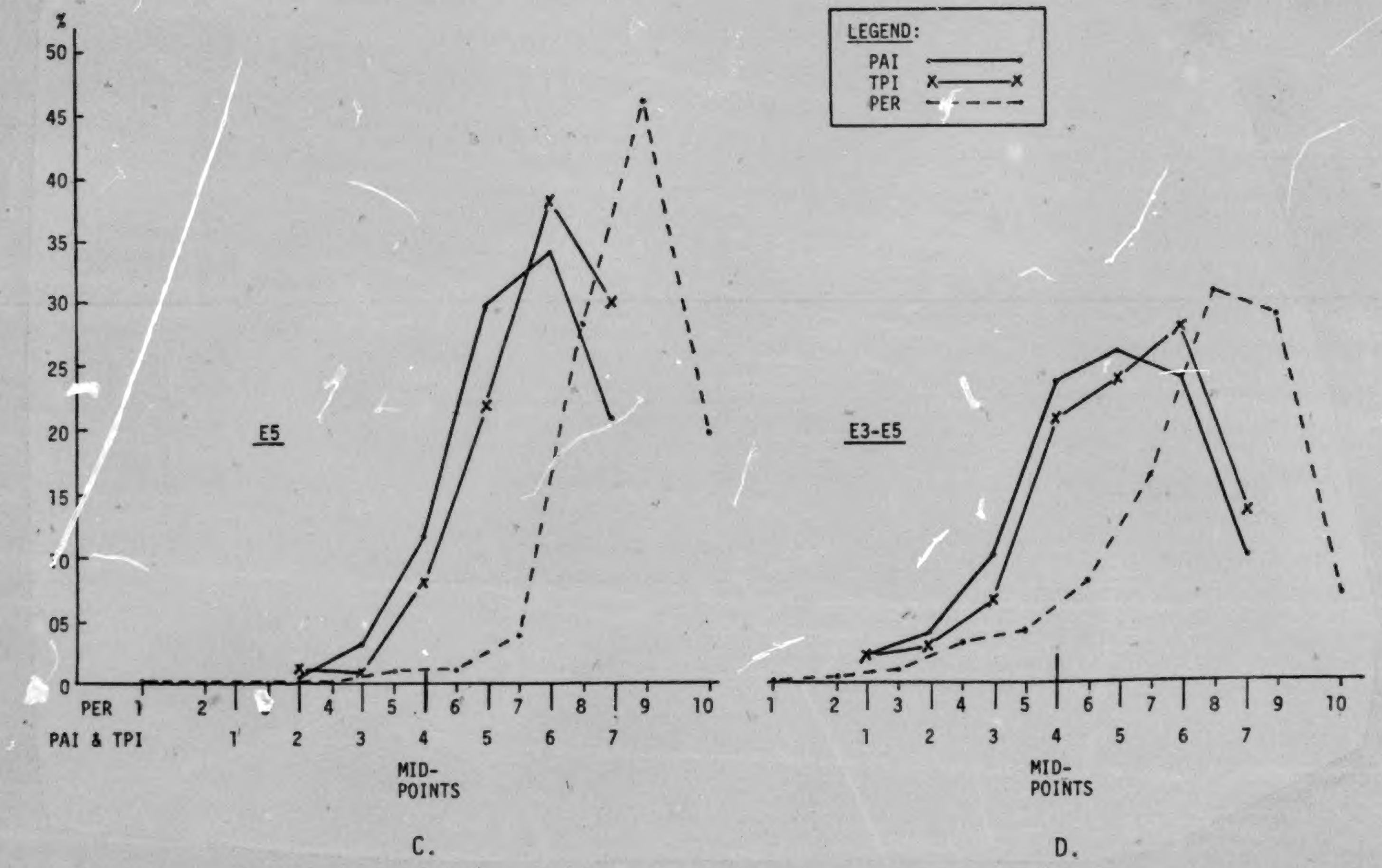

Figure 1. Frequency Distributions (in %) of Scale Value Usage for Three Rating Instruemnts Drawn with the Mid-Points of Scales Coinciding (Continued).

The greater leniency found in the PER data is obvious regardless of pay grade. The lack of use of the lower score values in the PER increases as pay grade rises. This tendency is also found in the experimental instruments, but to a lesser extent. The difference in leniency between the PAI and the TPI noted earlier is small but nevertheless apparent.

There is no clear suggestion of error central tendency in any of the instruments for pay grade E3 and certainly none for the higher grades.

Halo effects can be examined by considering the standard deviation of ratings given on all items for each job incumbent. That is, when a rater tends to assign similar scale values to a ratee, the standard deviation for that man will tend to approach zero. The standard deviations for each subject were averaged for each Navy job by pay grade for each of the instruments. See Table 7.

The data on subject standard deviations have been summarized in Tables 8 and 9. The results shown in Table 8 are equivocal. It appears that there is more halo for E5 relative to the other two pay grades with the two experimental instruments. Unexpectedly, there appears to be halo for E3 relative to E4 with the use of the TPI. The remainder of the table shows a lack of order and no further interpretations seem warranted.

Examination of the data in Table 9, in which instruments are compared, shows clear differences in halo effects. The PAI shows less halo than both the TPI and the PER, and the TPI shows less than the PER.

Halo, with respect to group membership, can be examined by considering the standard deviation of ratings given on an item for persons in different pay grades. That is, when raters tend to assign similar scale values on an item to all members of a group, the standard deviation for that item will tend to approach zero. The standard deviations for each item were averaged for each Navy job by pay grade for each of the instruments. See Table 10.

The data on item standard deviations have been summarized in Table 11 for comparisons between pay grades.

TABLE 7. MEAN OF SUBJECT STANDARD DEVIATIONS FOR THREE RATING INSTRUMENTS

	E3	E4	E5	E3-E5
PAI				
ABE	0.84	0.94	0.59	0.84
ABF	0.72	0.67	0.69	0.69
ABH	0.86	0.74	0.63	0.80
AO	0.65	0.67	0.73	0.67
EM	0.75	0.79	0.68	0.76
HT	0.55	0.64	NC*	0.60
IC	0.71	0.71	0.75	0.71
MS-S2	0.70	0.71	0.62	0.69
MS-S5	0.69	0.68	0.60	0.66
SK	0.76	0.73	0.66	0.73
TPI				
ABE	0.80	0.83	0.77	0.81
ABF	0.76	0.66	0.65	0.70
ABH	0.74	0.78	0.69	0.75
AO	0.61	0.68	0.62	0.64
EM	**	**	**	**
HT	**	**	**	**
IC	**	**	**	**
MS-S2	0.62	0.71	0.56	0.65
MS-S5	0.57	0.61	0.56	0.57
SK	0.51	0.67	0.66	0.62
PER				
ABE	0.47	0.66	0.29	0.51
ABF	0.67	0.48	0.31	0.54
ABH	0.60	0.47	NC	NC
AO	0.50	0.54	NC	NC
EM	0.47	0.60	0.66	0.57
HT	0.36	0.44	NC	NC
IC	0.56	0.52	NC	NC
MS-S2	0.43	0.47	NC	NC
MS-S5	0.33	0.33	NC	NC
SK	0.47	0.35	0.46	0.40

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*The number of cases was so low, that the statistic was not computed where NC is shown.

**No data were available.

TABLE 8. NUMBER OF TIMES AVERAGE SUBJECT STANDARD DEVIATIONS IN ONE PAY GRADE EXCEED ANOTHER FOR A GIVEN RATING INSTRUMENT

	PAI	TPI	PER
E3 > E4	4/8	1/7	4/9
E3 > E5	7/9	5/6	3/4
E4 > E5	6/9	6/6	2/4

TABLE 9. NUMBER OF TIMES AVERAGE SUBJECT STANDARD DEVIATIONS ON ONE RATING INSTRUMENT EXCEED ANOTHER FOR A GIVEN PAY GRADE

	PAI > TPI	PAI > PER	TPI > PER
E3	6/7	10/10	7/7
E4	4/6	10/10	7/7
E5	5/7	4/4	3/3

TABLE 10. MEAN OF ITEM STANDARD DEVIATIONS FOR THREE RATING INSTRUMENTS.

	E3	E4	E5	E3-E5
	$\bar{X}_{SD}$	$\bar{X}_{SD}$	$\bar{X}_{SD}$	$\bar{X}_{SD}$
PAI				
ABE	1.52	1.18	1.14	1.42
ABF	1.38	1.09	0.88	1.26
ABH	1.40	1.27	0.62	1.36
AO	1.60	1.42	1.17	1.56
EM	1.26	1.35	0.74	1.21
HT	1.42	1.12	0.16	1.24
IC	1.03	1.15	0.86	1.10
MS-S2	1.36	1.31	1.00	1.49
MS-S5	1.39	0.85	0.98	1.31
SK	1.34	1.07	1.23	1.27
TPI				
ABE	1.45	1.19	1.07	1.28
ABF	1.26	1.15	0.81	1.24
ABH	1.26	1.27	0.49	1.09
AO	1.52	1.44	0.97	1.18
EM	**	**	**	**
HT	**	**	**	**
IC	**	**	**	**
MS-S2	1.52	1.22	0.96	1.45
MS-S5	1.52	0.80	0.84	1.21
SK	1.05	1.00	1.05	0.98
PER				
ABE	1.05	0.88	0.38	1.03
ABF	0.72	0.78	0.40	0.81
ABH	1.07	0.60	NC*	0.98
AO	1.05	0.82	NC	0.94
EM	1.36	0.88	0.75	1.05
HT	0.61	1.02	0.28	0.97
IC	0.55	0.81	0.56	0.75
MS-S2	1.26	0.80	NC	1.03
MS-S5	0.98	0.61	NC	0.92
SK	1.03	0.70	0.78	0.92

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*The number of cases was so low, that the statistic was not computed where NC is shown.

**No data were available.

The effects of group halo are apparent in Table 11. Average item standard deviations are smaller for E5 than E4, and for E4 than E3 across all instruments.

In Table 12, the data have been summarized for the comparison of item standard deviations between instruments. These data are related to the discussion of Table 6 in which standard deviations of subject means were compared across instruments. Here the standard deviations of individual items are being compared. The proportions in the table show in general that the PAI provides better discrimination than either the TPI or PER, and the TPI provides better discrimination than the PER. The one exception is the comparison between PAI and TPI for the E4 group.

Based on the consistency of the findings, the PAI appears to possess slightly more promising characteristics than the TPI. It shows less leniency, better discrimination, and less halo.

Relationships Between Rating Instruments

Subject mean scores on the two experimental instruments were correlated with each other and with the PER (see Table 13).

The PAI - TPI correlations are extremely high. It will be recalled that for these data, the same rater evaluated the same person on both instruments. Unquestionably, halo is contributing to these correlations.

Because of the high correlations between the PAI and the TPI, they might appear to be interchangeable. However,the fundamental question of whether the instruments are measuring the same parameters, or different parameters that covary, remains. This question can only be studied with a different research design - one in which more than one rater evaluates the same job incumbent. Unfortunately, this condition could not be met in this study.

Each of the experimental instruments has potential value for evaluating job performance. However, the content of the PAI gives it much greater diagnostic generality and is necessary for cataloging the performance capabilities of men of different aptitude in different jobs (Phase II). On the other hand, versions of the TPI for additional Navy jobs could be developed without the intermediate step of analyzing these jobs. This is so because the TPI is based upon NOTAP data that is becoming available for more and more Navy jobs.

TABLE 11. NUMBER OF TIMES AVERAGE ITEM STANDARD DEVIATIONS IN ONE PAY GRADE EXCEED ANOTHER FOR A GIVEN RATING INSTRUMENT

	PAI	TPI	PER
E3 > E4	8/10	6/7	7/10
E3 > E5	10/10	6/6	6/7
E4 > E5	8/10	5/7	6/7

TABLE 12. NUMBER OF TIMES AVERAGE ITEM STANDARD DEVIATIONS ON ONE RATING INSTRUMENT EXCEED ANOTHER FOR A GIVEN PAY GRADE

	PAI > TPI	PAI > PER	TPI > PER
E3	7/9	9/10	7/7
E4	3/6	10/10	7/7
E5	7/7	5/7	4/4

TABLE 13. CORRELATIONS BETWEEN PAI-TPI, PAI-PER, & TPI-PER.

	PAI-TPI		PAI-PER	n For Correlations with PER	TPI-PER
	r	n	r		r
ABE	.91	77	.43	45	.22*
ABF	.95	59	.43	38	.46
ABH	.89	75	.39	57	.25*
AO	.94	78	.15*	52	.16*
EM	—	—	.30	48	—
HT	—	—	.50	34	—
IC	—	—	.35*	22	—
MS-S2	.91	54	.61	29	.62
MS-S5	.95	62	.29*	25	.27*
SK	.87	35	.83	23	.80

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*Not significant; all other correlations are significant at the .01 level.

Both experimental instruments will continue to be used in Phase II in order to validate the findings of Phase I.

Correlations of the PAI-PER and the TPI-PER are fairly similar, as would be anticipated, given the high correlations between the PAI and TPI. However, both experimental instruments, understandably, correlate less well with the PER. Presumably, this is partly because organizational and other pressures tend to restrict the range of scores on the PER. The spread of correlations from .15 or .16 for AO to .83 or .80 for SK was less expected. In three instances in the PAI-PER column, and in four in the TPI-PER column, the correlation coefficients are too low to assume that any real correlation exists. One of the possible explanations is that the raters in these Navy jobs applied quite different standards when filling out the PER than their counterparts who completed the PAI and TPI. It must be noted that PER evaluations had been made as much as six months earlier. Whether job incumbents could have changed that much (for better or worse) since their last evaluation is unlikely. To speculate further seems unwarranted.

In Phase II, the PER as well as the PAI and the TPI will be administered on an experimental basis. The non-operational administration of the PER should provide a clearer picture of the relationship of this instrument to the experimental instruments.

Comparison Of Performance Analysis Inventory Sections

It will be remembered that the PAI items had been categorized into five groups or sections (see Appendix D). In addition, 23 items were common to all of the Navy jobs and are contained within Section IV of the PAI.

The section means, and the means for the group of common items, are given in Table 14.

TABLE 14. MEANS & STANDARD DEVIATIONS OF THE PAI SECTIONS & OF ITEMS COMMON TO ALL NAVY JOBS.

PAI SECTION MEANS

	I. USE OF TOOLS & EQUIPMENT		II. HAND/ARM MANIPULATIONS		III. COORDINATION		IV. WORK HABITS & PROCESSES		V. OBTAINING & OBSERVING JOB RELEVANT INFO		COMMON	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
ABE	4.96	1.22	4.90	1.23	5.09	1.26	4.65	1.29	4.92	1.23	4.61	1.32
ABF	4.98	1.03	5.24	1.13	5.12	1.07	4.70	1.18	4.72	1.12	4.71	1.19
ABH	5.29	1.13	5.19	1.19	5.66	1.32	4.78	1.29	4.95	1.20	4.76	1.30
AO	5.03	1.33	4.84	1.47	5.16	1.32	4.62	1.51	4.63	1.42	4.60	1.52
EM	4.81	0.91	—	—	—	—	4.43	1.12	4.41	1.07	4.44	1.13
HT	4.63	1.03	4.72	1.07	4.59	1.03	4.63	1.20	4.47	1.03	4.64	1.22
IC	4.73	0.95	4.83	1.08	—	—	4.52	0.96	4.52	0.84	4.53	0.96
MS-S2	4.96	1.14	4.90	1.29	—	—	4.42	1.45	4.45	1.40	4.41	1.45
MS-S5	5.50	1.25	5.80	1.04	5.17	1.54	4.99	1.34	5.69	0.97	4.98	1.33
SK	4.72	1.10	4.84	1.09	—	—	4.87	1.14	5.48	1.00	4.86	1.14

We have viewed the common items as being potentially more useful than the others since they cover requirements that tend to be present in all jobs. For this reason, the common items were compared with the sections. Both the size of means and the standard deviations for each PAI section were compared to those of the common items. These comparisons are shown in Table 15.

The smaller means of the common items, at least when compared to Sections I-III, suggest that they are less susceptible to errors of leniency.

The larger standard deviations of the common items further suggest that they are somewhat more discriminating.

Thus, the common items alone might be used as a performance rating instrument. However, further research would be needed to determine if these items would retain the desired characteristics when administered alone.

In Phase II, it may be possible to include a small scale study of the characteristics of a rating instrument comprised solely of common items.

Intercorrelations were computed between Section I, IV, V, and common items. Sections II and III were not included in the analysis because of the small number of items they contained.

Upon inspection, it was found that the correlations between Section IV and common items were extremely high (all .99) as they should be since Section IV is comprised in large part of the common items. Further inspection showed that the correlations of both Sections I and V with either Section IV or the common items were either identical or no more different than .02 in their coefficients. For this reason, only correlations of PAI components with independent content are shown (see Table 16).

In general, Section I - Use of Tools and Equipment seems to be somewhat less related to both Section IV - Work Habits and Processes and Section V - Obtaining and Observing Job Relevant Information than Sections IV and V are to each other.

While the results are not completely consistent, they suggest that Section I items are measuring different elements of job performance, more so than Sections IV and V. This is in keeping with the impression obtained when the items are examined.

TABLE 15. NUMBER OF TIMES MEAN & STANDARD DEVIATIONS OF SECTIONS OF THE PAI EXCEED THOSE OF THE COMMON ITEMS

	I > Common	II > Common	III > Common	IV > Common	V > Common
$\bar{X}$	8/10	8/9	5/6	6/10	6/10
SD	0/10	1/9	2/6	1/7	0/10

TABLE 16. CORRELATIONS* BETWEEN SELECTED SECTIONS IN THE PAI

		IV	V		IV	V
I	ABE	.87	.87	ABF	.85	.85
IV			.87			.95
I	ABH	.80	.75	AO	**	**
IV			.88			.88
I	EM	.58	.55	HT	.87	.52
IV			.90			.46
I	IC	.68	.70	MS-S2	.87	.87
IV			.88			.94
I	MS-S5	.75	**	SK	.44	.41
IV			**			.62

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*Correlations are significant at the .001 level, except Section I with Sections IV and V in SK, which are significant at the .01 level.

**Due to a computer error, these correlations were unavailable at the time of publication.

Item Analysis

To develop final forms of the PAI and TPI, two analyses were undertaken to identify 1) items that fail to discriminate across subjects, and 2) items that are redundant in the sense that they correlate highly with other items.[8]

To eliminate items that fail to discriminate we used the average standard deviations for all items on a given form. If an item showed a standard deviation less than twice the size of the average for all items, it was eliminated. Items that showed more than twice the size of the average were retained since such items would appear to provide better than average discrimination among job incumbents. As a consequence of this analysis only three items were eliminated in the PAI forms and four were eliminated in the TPI forms.

Next, item intercorrelations were examined. This was done to identify items that might be combined in a single rewritten item rather than as a basis for discarding one of the pair. Since cross-validation was not possible during the study, this seemed preferable. It should also increase the likelihood that items will have content relevant to the job activities of more incumbents in different billets. To be conservative in this analysis, only items correlating at .90 or higher were identified.

An example of two highly correlated items in the PAI is "Work produced using hand powered non-precision tools/instruments" and "Work produced using energy powered non-precision tools/instruments". Clearly these can readily be combined into "Work produced using non-precision tools/instruments" with examples then provided that are both hand powered and energy powered.

Two highly correlated items in the TPI are "Directing aircraft using standard taxi signals" and "Directing movement of aircraft during respot".

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[8] It will be recalled that a number of items had been eliminated earlier, primarily from the TPI, because the tasks were infrequently or never performed (see page 15).

In subsequent work, 13 PAI items will be combined in those instances where both items appear in the original rating form. The number of TPI items to be combined and the number of items that will result are shown below:

	NO. OF ORIGINAL ITEMS	NO. OF FINAL ITEMS
ABE	2	1
ABF	2	1
ABH	4	2
AO	10	4
MS-S2	17	7
MS-S5	11	4
SK	—	—

Both the items that will be eliminated and those that will be combined are identified in Appendix F. The items to be deleted are both those few that failed to discriminate, and those identified in the preliminary data processing as being rarely or never performed. The actual revision of the instruments will be accomplished as the first task in Phase II.

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APPENDIX A

HumRRO FORM OF THE POSITION ANALYSIS QUESTIONNAIRE

POSITION ANALYSIS QUESTIONNAIRE

(HumRRO Edition)

Rate and Rating Being Evaluated: ____________________

Name of Evaluator: ____________________

Rate and Rating: ____________________

Number of Years in Rating: ____________________

Address: ____________________

____

____

____

Phone No.: ____________________

Date of Evaluation: ____________________

POSITION ANALYSIS QUESTIONNAIRE (PAQ)

(HumRRO Edition)

Instructions for Completing PAQ for Naval Ratings

The Position Analysis Questionnaire (PAQ), as it is to be used in this Navy survey, provides for describing certain characteristics of naval ratings. In this connection, it is to be used to describe the primary duties of each rating, and not the collateral or watch (extra) duties.

Instructions and a scale are provided for use with each job element (item) in the PAQ. Your task is to consider each element in the questionnaire and select the most appropriate response from the scale provided. Each time a black dot appears (●), a new instruction and scale are given.

You should keep the following in mind when analyzing a rating:

The examples given for many job elements in the PAQ are intended only to illustrate the job element, and do not indicate the complete range of possible content. Several of the examples are from "civilian" types of jobs, but they may have their counterparts in naval activities. The analyst should interpret the "content" of each job element as it relates to the naval rating which he is analyzing.

I. Work Output

- Answer each item below by deciding how important it is in performing in most billets in this rate and rating.

Use This Scale

Code	Importance
0	Does not apply
1	Very minor
2	Low
3	Average
4	High
5	Extreme

A. Using Manually Powered Hand Held Tools or Instruments

_____ 1. Precision tools/instruments (that is, tools or instruments powered by the user to perform very accurate or precise operations; for example, the use of engraver's tools, watchmaker's tools, surgical instruments, etc.)

_____ 2. Non-precision tools/instruments (tools or instruments powered by the user to perform operations not requiring great accuracy or precision; for example, hammers, wrenches, trowels, knives, scissors, chisels, putty knives, strainers, hand grease guns, etc.; do not include long-handle tools here).

_____ 3. Long-handle tools (hoes, rakes, shovels, picks, axes, brooms, mops, etc.)

_____ 4. Handling devices/tools (tongs, ladles, dippers, forceps, etc., used for moving or handling objects and materials; do not include here protective gear such as asbestos gloves, etc.)

B. Using Powered Hand Held Tools and Instruments

Powered (manually controlled or directed devices using an energy source such as electricity, compressed air, fuel, hydraulic fluid, etc., in which the component part which accomplishes the modification is hand-held, such as dentist drills, welding equipment, etc., as well as devices small enough to be entirely hand-held)

_____ 5. Precision tools/instruments (hand-held powered tools or instruments used to perform operations requiring great accuracy or precision, such as dentist drills, soldering irons, welding equipment, saws, etc., used for especially accurate or fine work).

_____ 6. Non-precision tools/instruments (hand-held, energy-powered tools or instruments used to perform operations not requiring great accuracy or precision; for example, power saws, drills, sanders, clippers, etc., and related devices such as electrical soldering irons, spray guns or nozzles, welding equipment, etc.)

C. Using Other Hand Held Devices

_____ 7. Drawing and related devices (instruments or devices used in writing, sketching, illustrating, drafting, etc.; for example, pens, pencils, drawing instruments, artist's brushes, drafting equipment, etc.; do not include measuring instruments here, see item [illegible]).

_____ 8. Applicators (brushes, rags, paint rollers, etc., which are hand-held and used in applying solutions, materials, etc.; do not consider devices covered by items   above).

_____ 9. Measuring devices (rulers, measuring tapes, micrometers, calipers, protractors, squares, thickness gauges, levels, volume measuring devices, stopwatches, etc.)

_____ 10. Technical devices (cameras, binoculars, periscopes, sextants, surveyor's transit, slide ruler, etc.)

D. Using Stationary Machines and Equipment

_____ 11. Machines/equipment (used to communicate, e.g. radios, to generate power, or to process, fabricate, or otherwise modify parts, objects, materials, etc.; use this cateogry in addition to indicating the controls used in the subsection which follows).

E. Using Control Devices (on any equipment operated or used)

_____ 12. Activation controls (hand or foot operated devices used to start, stop, or otherwise activate energy-using systems or mechanisms; for example, light switches, electric motor switches, ignition switches, etc.)

_____ 13. Fixed setting controls (hand or foot operated devices with distinct positions, detents, or definite settings; for example, TV selector switch, gear-shift, etc.)

_____ 14. Variable setting controls (hand or foot operated devices that can be set at the beginning of operation, or infrequently, at any position along a scale; for example, TV volume control, thermostat, rheostat, etc.)

_____ 15. Keyboard devices (typewriters, adding machines, calculators, pianos, keypunch machines, etc.)

_____ 16. Hand-operated controls (controls operated by hand or arm for making frequent, but not continuous, adjustments; for example, hand controls on a crane or bulldozer, valve controls, helm of ship, etc.)

_____ 17. Foot-operated controls (controls operated by foot or leg for making frequent, but not continuous, adjustments; for example, automobile brakes, etc.)

_____ 18. Hand-operated controls (controls operated by hand and used continuously for adjusting to changing, or possible changing, situations; for example, use of steering wheel, controls on a "tracking" device, etc.)

_____ 19. Foot-operated controls (controls operated by foot and used continuously for adjusting to changing, or possibly changing, situations; for example, accelerator, etc.)

F. Using Transportation and Mobile Equipment

_____ 20. Man-moved mobile equipment (hand trucks, wheel barrows, floor polishers and buffers, etc.)

_____ 21. Man-powered vehicles (bicycles, rowboats, punts, etc.)

_____ 22. Powered highway/rail vehicles (vehicles intended primarily for highway or railroad transportation; for example, automobiles, trucks, buses, trains, etc.)

_____ 23. Powered mobile equipment (movable vehicles not primarily intended for highway use; for example, warehouse trucks, fork lifts, road graders, tractors, etc.)

_____ 24. Powered water vehicles (ships, submarines, small boats, etc.)

_____ 25. Air/space vehicles (planes, helicopters, balloons, gliders, rocketships, etc.)

_____ 26. Operating equipment (cranes, hoists, elevators, etc.)

_____ 27. Remote-controlled equipment (conveyor systems, etc.)

G. Engaging in Manual Activities

This section describes manual activities in which tools may or may not be used.

_____ 28. Setting up/adjusting (adjusting, calibrating, aligning and/or setting up of machines or equipment; for example, setting up a lathe or drill press, adjusting an engine carburetor, adjusting, calibrating, and aligning electric circuitry, etc.)

_____ 29. Manually modifying (using hands directly to form or otherwise modify materials or products; for example, kneading dough by hand, folding letters etc.)

_____ 30. Material-controlling (manually controlling or guiding materials being processed; for example, in operating sewing machine, jig saws, etc.)

_____ 31. Assembling/disassembling (either manually or with the use of hand tools putting parts or components together to form more complete items, or taking apart or disassembling items into their component parts).

_____ 32. Arranging/positioning (manually placing objects, materials, etc., in a specific position or arrangement; for example, in displays, in stocking shelves, positioning patients for certain medical and dental procedures, etc.; do not include here arranging/positioning which is a part of the operations listed in items [illegible]).

_____ 33. Feeding/off-bearing (manually inserting, throwing, dumping or placing materials into or removing them from machines or processing equipment; this category is not to be used in describing operations in which the worker manually guides or controls the materials or parts during processing, as in item [illegible]).

_____ 34. Physical handling (physically handling objects, materials, human beings, etc., either manually or with nominal use of aiding devices; for example, in certain warehousing activities, loading/unloading conveyor belts or trucks, packaging, hospital procedures, etc.; typically there is little requirement for careful positioning or arrangement of objects; include here relatively uninvolved handling operations not provided for in items [illegible]).

H. Engaging in Manipulation/Coordination Activities

_____ 35. Finger manipulation (making careful finger movements in various types of activities; for example, fine assembly, use of precision tools, repairing watches, use of writing and drawing instruments, operating keyboard devices, etc.; usually the hand and arm are not involved to any great extent).

_____ 36. Hand-arm manipulation (the manual control or manipulation of objects through hand and/or arm movements, which may or may not require continuous visual control; for example, repairing engines, semaphore signalling, etc.)

_____ 37. Hand-arm steadiness (maintaining a uniform, controlled hand-arm posture or movement; for example, using a welding torch, soldering, etc.)

_____ 38. Hand/foot coordination with eye (the coordination of hand and/or foot movements where the movement must be coordinated with what is seen; for example, driving a vehicle, operating a sewing operating a winch, tuning radar, using electronic test equipment for alignment, etc.)

_____ 39. Limb movement without visual control (movement of body limbs from one position to another without the use of vision; for example, reaching for controls without looking, touch typing, etc.)

_____ 40. Hand-ear coordination (the coordination of hand movements with sounds or instructions that are heard; for example, tuning radio receivers, piloting aircraft by control tower instructions, etc.)

_____ 41. Highly skilled body coordination (activities involving extensive, and often highly-learned coordination activities of the whole body, such as characterized by athletic activities).

_____ 42. Balancing (maintaining body balance or equilibrium to prevent falling when standing, walking, running, crouching, etc., on narrow, slippery, steeply inclined or erratically moving surfaces; for example, walking on narrow elevated plank, during underway replenishment, etc.)

- Answer each item below by deciding how frequently a worker in most billets in this rate and rating works under the following conditions.

Use
This
Scale

Code	Frequency
0	Does not apply (or almost never)
1	Very infrequently
2	Occasionally
3	A moderate amount
4	Frequently
5	Almost continuously

_____ 43. At a specified work pace (as on a controlled assembly line)

_____ 44. On repetitive activities (performance of the same physical or mental activities repeatedly, without interruption, for periods of time).

_____ 45. On cycled work activities (performance of a sequence or schedule of work activities which typically occurs on a weekly, daily, or hourly basis and which typically allows the worker some freedom of action so long as he meets a schedule; for example, a security guard patrolling his beat, preparing scheduled reports, etc.; do not include here activities more nearly described as repetitive activities in item above).

_____ 46. Following set procedures (need to follow specific set procedures or routines in order to obtain satisfactory outcomes; for example, following check-out list to inspect equipment or vehicles, following procedures for changing a tire, performing specified laboratory tests, etc.)

_____ 47. Under time pressure of situation (having meals ready in mess, urgent time deadlines, rush jobs, etc.)

II. Obtaining and Processing Job Information

- Answer each item below by deciding how important it is in performing in most billets in this rate and rating.

Use This Scale

Code	Importance
0	Does not apply
1	Very minor
2	Low
3	Average
4	High
5	Extreme

_____ 48. Reading written materials (books, reports, memos, job instructions, logs, signs, etc.)

_____ 49. Using numeric materials (materials which deal with quantities or amounts, such as graphs, accounts, specifications, tables of numbers, etc.)

_____ 50. Looking at pictorial materials (pictures or picture-like materials used as sources of information, for example, drawings, blueprints, diagrams, tracings, charts, photographic film, x-ray films, TV pictures, etc.)

_____ 51. Looking at templates, stencils, patterns, etc., used as sources of information; do not include here materials described in item 3 above

_____ 52. Observing visual displays (dials, gauges, signal lights, radar scopes, speedometers, clocks, monitors, microfiche, etc.)

_____ 53. Using measuring devices (rulers, calipers, scales, thickness gauges, pipettes, thermometers, protractors, etc. used to obtain visual information about physical measurements; do not include devices described in item 5)

_____ 54. Observing mechanical devices (tools, equipment, machinery, and other mechanical devices which are sources of information when observed during use or operation)

_____ 55. Observing materials as he is working with or modifying them (parts, materials, objects, etc., which are sources of information when being modified, worked on, or otherwise processed, such as bread dough being mixed, workpiece being turned in a lathe, etc.)

_____ 56. Observing or inspecting materials that he is not modifying (parts, materials, objects, etc., not in the process of being changed or modified, which are sources of information when being inspected, handled, packaged, distributed, or selected, etc., such as items or materials in inventory, storage, or distribution channels, items being inspected, etc.)

______ 57. Observing or examining features of nature (geological formations, vegetation, cloud formations, and other features of nature which are observed or inspected to provide information)

______ 58. Observing or examining man-made features of environment (structures, ships, buildings, dams, highways, bridges, docks, and other "man-made" or altered aspects of the indoor or outdoor environment which are observed or inspected to provide job information)

______ 59. Observing behavior (observing the actions of people or animals; for example, in teaching, supervising, etc., where this behavior is a source of job information)

______ 60. Observing events or circumstances (those events he visually observes and in which he may participate, such as movement of ships, movement of materials, airport control tower operation, etc.)

______ 61. Listening to spoken information (verbal instructions, orders, requests, conversations, interviews, discussions, formal meetings, etc.; consider only verbal communication which is relevant to job performance)

______ 62. Listening to sounds (for example, noises, engine sounds, sonar, whistles, musical instruments, signals, horns, etc.)

______ 63. Touching (pressure, temperature, moisture, etc.; for example, feeling texture of surface, etc.)

______ 64. Smelling (odors which the worker needs to smell in order to perform his job; do not include odors simply because they happen to exist in the work environment)

______ 65. Tasting (bitter, sour, sweet, or salty qualities which are sources of job information; for example, cooks, stewards, etc.)

______ 66. Seeing differences using far vision (seeing differences in the details of objects, events, or features beyond arm's reach; for example, operating a vehicle, lookout watch, air controller, etc.)

______ 67. Seeing differences in color (differentiating or identifying objects, materials, or details on the basis of color; for example, identifying running lights, etc.)

______ 68. Being precise (need to be more than normally precise and accurate).

______ 69. Paying attention to detail (need to give careful attention to various details of one's work, being sure that nothing is left undone).

______ 70. Being vigilant in observing infrequent events (need to continually search for very infrequently occurring but relevant events in the job situation; for example, observing instrument panel to identify infrequent change from "normal", etc.)

_____ 71. Being vigilant to continually changing events (need to be continually aware of variations in a continually or frequently changing situation; for example, driving in traffic, controlling aircraft traffic, continually watching frequently changing dials and gauges, etc.)

_____ 72. Judging depth or distance (judging the distance from the observer to objects or the distances between objects as they are positioned in space, as in operating a crane, manual gun sighting, handling and positioning objects, etc.)

_____ 73. Recognizing sound patterns (recognizing different patterns, or sequences of sounds; for example, those involved in Morse code, heart beats, engines not functioning correctly, etc.)

_____ 74. Recognizing sounds by loudness, pitch, and/or tone quality (for example, sonar operation, tuning a musical instrument, repairing a sound system).

_____ 75. Sensing or recognizing changes in the direction or speed at which the body is being moved without using sight or hearing (for example, as in flying aircraft, working in internal compartments aboard ship, etc.; rate in terms of its importance in actual performance of duties)

_____ 76. Sensing the position and balance of the body (for example, climbing on high masts, walking on slippery decks or on narrow gangplanks, aircraft refueling, hazardous types of maintenance jobs such as side cleaning, etc.)

_____ 77. Estimating speed of moving parts (parts of stationary objects, for example, the revolutions per minute of a motor, the speed at which a lathe turns, etc.)

_____ 78. Estimating speed of moving objects or materials (objects or materials moving relative to a fixed point or to other moving objects; for example, the speed of vessels or aircraft, materials on a conveyor belt, etc.)

_____ 79. Estimating speed of processes or events (on-going processes or a series of events while they are taking place; for example, chemical reactions, assembly operations, timing of food preparation in galley, etc.)

_____ 80. Judging condition/quality of equipment, material or weapon systems (estimating the condition, quality, and/or operational readiness of electronic systems, engineering systems, weapon systems, etc.; judging value of surplus items to be liquidated; etc.)

_____ 81. Inspecting products, objects, materials, etc. in terms of established standards (either one's own work products or that of others; for example, identifying defects, classifying by grade, etc.; do not include here activities described in item above).

____ 82. Estimating weight, number, volume of objects without direct measurement (for example, of foodstuffs, supplies on hand, weight of material in a cargo net, volume of gas, etc.)

____ 83. Estimating size without direct measurement (length, thickness, or height; for example, length of a ship, thickness of armor plate, height of a wave).

____ 84. Estimating time (time required for past or future work activities; for example, judging the amount of time to make a delivery, estimating the time required to service a worn machine part or piece of equipment, judging the length of time required to set up a lathe, etc.)

____ 85. Transcribing (copying or posting data or information for later use; for example, copying gauge readings in a record book, keeping a bell log, recording weather, etc.)

____ 86. Compiling (gathering, grouping, classifying, or in some other way arranging information or data in some meaningful order or form; for example, preparing standard reports of various kinds, filing correspondence on the basis of content, assembling particular data that have been gathered).

____ 87. Coding/decoding (coding information or converting coded information back to its original form; for example, "reading" Morse Code, translating foreign languages, or using other coding systems such as shorthand, mathematical symbols, computer languages, drafting symbols, replacement part numbers, etc.; TTY; cryptography; etc.)

____ 88. Analyzing information or data (for the purpose of identifying underlying principles or facts by breaking down information into component parts; for example, interpreting intelligence reports, diagnosing mechanical disorders or medical symptoms, ECM operators, etc.)

____ 89. Combining information (combining, synthesizing, or integrating information or data from two or more sources to establish new facts, hypotheses, theories, or a more complete body of related information; for example, integrating intelligence information, a pilot flying aircraft, a weatherman using information from various sources to predict weather conditions, radarman, signalman, etc.)

____ 90. Remembering information for a brief period of time (learning and retaining job-related information and recalling that information after a brief period of time, for example, cook, telephone operator, helmsman, messenger, etc.)

____ 91. Remembering information beyond a brief period (learning and retaining job related information and recalling that information beyond a brief period of time, for example, International Morse Code, security regulations, damage control factors, equipment operating and maintenance procedures)..

- Select the highest level of mathematics needed to perform in most billets in this rate and rating.

Use This Scale

Code	Level of Mathematics
0	Does not apply
1	Simple basic (counting, additions and subtraction of 2-digit numbers or less)
2	Basic (addition and subtraction of numbers of 3-digits or more, multiplication, division, etc.)
3	Intermediate (calculations and concepts involving fractions, decimals, percentages, etc.)
4	Advanced (algebraic, geometric, trigonometric, and statistical concepts, techniques, and procedures, usually applied in standard practical situations).
5	Very advanced (advanced mathematical and statistical theory, concepts, and techniques; for example, calculus, topology, vector analysis, factor analysis, probability theory, etc.)

_____ 92. Level of mathematics needed.

III. Decision Making, Reasoning and Planning

- Select the level of decision making that best characterizes the decisions that need to be made in most billets in this rate and rating.

Use This Scale

Code	Level of Decision
1	Low level decisions ("decisions" such as those in selecting parts in routine assembly, shelving items in a storeroom, etc.)
2	Below average level decisions ("decisions" such as those in operating or dispatching vehicles, lubricating a truck, etc)
3	Average level decisions ("decisions" such as those in setting-up machine tools for operation, diagnosing mechanical disorders of aircraft, ordering office supplies several months in advance, etc.)
4	Above average level decisions ("decisions" such as those in making personnel decisions such as promotions and disciplinary actions, determining flight plan, etc.)

_____ 93. Level of decision making in this rate and rating.

- Select the level of reasoning used in solving problems in most billets in this rate and rating.

Use
This
Scale

Code	Level of Reasoning
1	Low level reasoning in problem solving (use of common sense to carry out simple, or relatively uninvolved, instructions; for example, sweeper, messenger, stores working party, etc.)
2	Below average level reasoning in problem solving (use of some training and/or experience to select from a limited number of solutions the most appropriate action or procedure in performing; for example, an issuing clerk) - [illegible]
3	Average level of reasoning in problem solving (uses principles learned in training or through experience in situations where several actions are possible and in which a complete set of fixed procedures or rules does not exist; for example, draftsman, carpenter, ship navigation, non-routine repair of mechanical equipment, etc.)
4	Above average (use of logic to define problems, collect information, establish facts, and draw valid conclusions; for example, individual responsible for trouble-shooting complex electronic and weapon systems, aeronautical engineering officer, etc.)
5	High (use of principles of logical or scientific thinking to solve a wide range of intellectual and practical problems; for example, commanding a vessel, research scientists, etc.)

_____ 94. Level of reasoning used in solving problems.

- Select the amount of planning/scheduling the worker does which affects his own activities or the activities of others in most billets in this rate and rating.

Use This Scale

Code	Amount of Planning
0	Does not apply (has no opportunity to plan even his own activities).
1	Very limited (has limited opportunity to plan or schedule his own activities; for example, mess cook, side cleaner, etc.)
2	Limited (some planning is required, typically of one's own work activities; for example, the planning that would be done by a radio operator, etc.)
3	Moderate (a moderate amount of planning of his own or other activities is required; for example, a carpenter who must plan the best way to build a structure, a dispatcher, etc.)
4	Considerable (a fairly large amount of planning/scheduling is required; for example, a petty officer who must plan the activities of his subordinates or plan/schedule the arrival and distribution of materials, an instructor who must prepare lectures or lesson plans, etc.)
5	Extensive (substantial amount of planning/scheduling is required, for example, a department head, an executive officer who must plan the activities of different work groups or engaged in contingency planning, etc.)

_____ 95. Amount of planning/scheduling.

IV. Relationships with Other Persons

- Answer each item below by deciding how important it is in performing in most billets in this rate and rating.

Use
This
Scale

Code	Importance
0	Does not apply
1	Very minor
2	Low
3	Average
4	High
5	Extreme

_____ 96. Advising (dealing with individuals in order to counsel, and/or guide them with regard to legal, financial, technical, personal or spiritual problems)

_____ 97. Negotiating (dealing with others in order to reach an agreement or solution; for example, working arrangements, negotiating procurement contracts, etc.)

_____ 98. Persuading (dealing with others in order to influence them toward some action or point of view; for example, public relations officers, recruitment personnel, etc.)

_____ 99. Instructing (the teaching of knowledge or skills, either in an informal or formal manner, to others; for example, instructor, petty officer teaching a striker, etc.)

_____ 100. Interviewing (conducting interviews directed toward some specific objective; for example, interviewing applicants in recruiting office, career counseling, etc.)

_____ 101. Routine information exchange (the giving and/or receiving of information of a routine or simple nature; for example, radio operator, receptionist, information clerk, etc.)

_____ 102. Non-routine information exchange (the giving and/or receiving of information of a non-routine or complex nature; for example, engineers discussing shipyard overhaul, officers call, CIC to OOD, lookout to OOD, etc.)

_____ 103. Public speaking (making speeches or formal presentations before relatively large audiences; for example, lecturing, radio/TV broadcasting, delivering a sermon, etc.)

_____ 104. Writing (for example, writing or dictating letters, reports, etc., writing notices, writing instructions, etc. do not include transcribing activities described in item 38)

_____ 105. Signaling (communicating by some type of signal; for example, hand signals, whistles, horns, bells, lights, etc.)

_____ 106. Code and decode communications (telegraph, cryptography, shorthand, etc.)

_____ 107. Serving (attending to the needs of, or performing personal services for, others; for example, mess cook, barbers, sick-bay attendant, etc.)

- Answer the item below by deciding how much personal contact is required in performing in most billets in this rate and rating. (Contact with an individual or groups, for example, contact with patients, the public, superior, subordinates, fellow shipmates, official visitors, etc.; consider only personal contact which is definitely part of the rating.)

Use This Scale

Code	Extent of Required Personal Contact
1	Very infrequent (almost no contact with others is required)
2	Infrequent (limited contact with others is required)
3	Occasional (moderate contact with others is required)
4	Frequent (considerable contact with others is required)
5	Very frequent (almost continual contact with others is required)

_____ 108. Extent of contact with others.

- Answer each item below by deciding how important personal contact with each of the types of individuals indicated is in performing in most billets in this rate and rating. Consider personal contact not only with personnel within the organizations, but also with personnel from other organizations, if contact with them is part of the rating.

Use This Scale

Code	Importance
0	Does not apply
1	Very minor
2	Low
3	Average
4	High
5	Extreme

_____ 109. Officials/executives (flag officers, squadron commanders, commanding officer, executive officers, etc.)

_____ 110. Staff personnel/middle management (department and division officers, other staff officers, etc.)

_____ 111. Supervisors (those personnel who have immediate responsibility for a work group; for example, leading petty officers, etc.)

_____ 112. Clerical personnel (personnel engaged in office work, such as yeoman, personnel men, dispersing clerks, etc.)

_____ 113. Manual and service workers (personnel in skilled, semi-skilled, unskilled, and related types of work, such as deck crew, engine room crew, etc.)

_____ 114. Public customers (as in ship service stores, base cafeterias, etc.)

_____ 115. The public (not including customers or persons in other specified categories; include the "public" as contacted by, for example, masters at arms, etc.)

_____ 116. Trainees/apprentices

- Select the level of supervision that is typically received by a person working in most billets in this rate and rating.

Use This Scale

Code	Level of Supervision Received
1	Immediate supervision (receives close supervision relating to specific work activities, including assignments, methods, etc.; usually receives frequent surveillance over job activities)
2	General supervision (receives general supervision relating to work activities)
3	General direction (receives only very general guidance relating to job activities, primarily guidance with respect to general objectives; has rather broad latitude for determining methods, work scheduling, how to achieve objectives, etc.; for example, department and division officers, etc.)
4	Nominal direction (receives only nominal direction or guidance in job, as in the case of a manager of an organization or a major subdivision thereof, and is therefore subject only to very broad policy guidelines; for example, commanding officers, etc.)

_____ 117. Level of supervision typically received by a person in this rating

- Indicate the importance of supervising other persons in most billets in this rate and rating (that is, persons directly supervised who are actually involved in the repairing of equipment, in maintenance, in service activities, etc.)

Use This Scale

Code	Importance
0	Does not apply
1	Very minor
2	Low
3	Average
4	High
5	Extreme

_____ 118. Importance of supervising other persons.

V. Working Conditions

- Select the level of physical exertion that is most descriptive of work in most billets in this rate and rating.

Use This Scale

Code	Level of Physical Exertion
1	Very light (occasionally walking or standing and/or occasionally moving light objects, materials, etc., such as yeoman, draftsman, radio operator, etc.)
2	Light (frequently walking or standing and/or frequently exerting force equivalent to lifting up to approximately 10 pounds and/or occasionally exerting force equivalent to lifting about 20 pounds)
3	Moderate (frequently exerting forces equivalent to lifting up to approximately 25 pounds and/or occasionally exerting forces equivalent to lifting up to approximately 50 pounds; for example, light engine mechanic, bus driver, etc.)
4	Heavy (frequently exerting forces equivalent to lifting up to approximately 50 pounds and/or occasionally exerting forces equivalent to lifting up to approximately 100 pounds; for example, general laborer, bulldozer operator, heavy equipment mechanic, etc.)
5	Very heavy (frequently exerting forces equivalent to lifting over 50 pounds and/or occasionally exerting forces over that required to lift 100 pounds; for example, stevedores, etc.)

_____ 119. Level of physical exertion typical of this rating.

- Answer each item below by deciding how frequently a worker in most billets in this rate and rating works under the following conditions.

Use This Scale

Code	Frequency
0	Does not apply (or almost never)
1	Very infrequently
2	Occasionally
3	A moderate amount
4	Frequently
5	Almost continuously

_____ 120. Working under distractions (telephone calls, interruptions, disturbances from others, etc.)

_____ 121. Out-of-door environment (susceptible to changing weather conditions)

_____ 122. High temperature (conditions in which the worker might experience severe discomfort or heat stress, such as in boiler rooms, around furnaces, etc.; typically this would occur in a dry atmosphere at about 90° F. and in a humid atmosphere at about 80° F. or 85° F.) (Do not consider indoor temperature conditions that are simply a function of the weather, for example, heat in summer.)

_____ 123. Low temperature (conditions in which the worker is exposed to low temperatures which are definitely uncomfortable even though clothing appropriate for the conditions may be worn, for example, on deck during extreme weather, in refrigerated rooms, etc.)

_____ 124. Air contamination (dust, fumes, smoke, toxic conditions, disagreeable odors, etc.; consider here air contamination or pollution which is an irritating or undesirable aspect of the rating).

_____ 125. Vibration (vibration of whole body or body limbs; for example, driving a tractor or truck, operating an air hammer, etc.)

_____ 126. Improper illumination (inadequate lighting, excessive glare, etc.)

_____ 127. Dirty environment (an environment in which the worker and/or his clothing easily becomes dirty, greasy, etc.; for example, environments often associated with engine rooms, road construction, furnace cleaning, etc.)

_____ 128. Awkward or confining work space (conditions in which the body is cramped or uncomfortable or which call for kneeling, stooping, crawling, crouching, etc.)

_____ 129. Climbing (for example, painter, telephone lineman, etc.)

_____ 130. Being suspended or positioned at considerable height (for example, painting, suspended in a boatswain's, working on a smoke stack, etc.)

- Answer the item below by deciding on the intensity of noise that a worker is typically exposed to in most billets in this rate or rating.

Use This Scale

Code	Noise Intensity
1	Very quiet (intensive care ward in hospital, photo lab, etc.)
2	Quiet (offices, libraries, etc.)
3	Moderate (office where typewriters are used, light automobile traffic, ship service store, etc.)
4	Loud (heavy traffic, machine shops, carpenter shops, etc.)
5	Very loud (close to jet engines, large earth-moving equipment, riveting, etc.)

_____ 131. Noise intensity typical of working in this rating.

- Answer each item below by deciding how important it is in performing in most billets in this rate and rating.

Use This Scale

Code	Importance
0	Does not apply
1	Very minor
2	Low
3	Average
4	High
5	Extreme

_____ 132. Observing safety precautions on the job.

_____ 133. Enforcing safety precautions of others.

_____ 134. Being responsible for material assets (attention to factors that can result in waste, loss, or damage of equipment or materials).

- Answer the item below by deciding upon the possibility of accidents or illnesses to a worker in most billets in this rate and rating. In making this decision consider the threat of physical hazards such as traveling at high speeds, being in high places, working with machinery, sharp tools, hot or very cold materials, exposure to falling objects, dangerous chemicals, explosives, toxic fumes, nuclear and radio frequency radiation, high voltages, etc.

Use This Scale

Code	Possibility of Accidents/Illnesses
0	No possibility
1	Very limited
2	Limited
3	Moderate
4	Fairly high
5	High

_____ 135. Possibility of accidents/illnesses

- Answer each item below by deciding how frequently a worker in most billets in this rate and rating encounters the situations or requirements listed.

Use This Scale

Code	Frequency of Occurrence
0	Does not apply
1	Very infrequently
2	Occasionally
3	A moderate amount
4	Frequently
5	Very frequently

_____ 136. Frustrating situations (job situations in which attempts to deal with problems or to achieve job objectives are seriously obstructed or hindered, and may thus contribute to frustration on the part of the worker)

_____ 137. Strained personal contacts (dealing with individuals or groups in "unpleasant" or "strained" situations; for example, certain aspects of shore patrol work, handling certain mental patients, MAA, etc.)

_____ 138. Situations requiring personal sacrifice (being willing to make particular personal sacrifices while being of service to other people or the objectives of an organization; for example, working beyond duty hours; do not consider physical hazards here)

_____ 139. Interpersonal conflict situations (job situations in which there are virtually inevitable differences in objectives, opinions, or viewpoints between the worker and other persons or groups of persons, and which may "set the stage" for conflict; for example, supervisors who must enforce an unpopular policy, etc.)

APPENDIX B

JOB DIMENSIONS REPRESENTED IN THE HumRRO PERFORMANCE ANALYSIS INVENTORY FORMS

The following list presents 26 of the 31 elements, previously identified by Marquardt and McCormick[1], that are represented in the Performance Analysis Inventories which appear in Appendix C.

1. Perceptual Interpretation
2. Evaluation of Sensory Input
3. Visual Input from Devices/Materials
4. Input from Representational Sources
5. Environmental Awareness
6. Decision Making
7. Information Processing
8. Manual/Control Activities
9. Physical Coordination in Control/Related Activities
10. General Body Activity versus Sedentary Activities
11. Manipulating/Handling Activities
12. Adjusting/Operating Machines/Equipment
13. Skilled/Technical Activities
14. Use of Miscellaneous Equipment/Devices
15. Interchange of Ideas/Judgments/Related Information
16. Supervisory/Staff Activities
17. Public/Related Personal Contact
18. Communicating Instructions/Directions/Related Job Information
19. General Personal Contact
20. Job-Related Communications
21. Potentially Stressful/Unpleasant Environment
22. Potentially Hazardous Job Situations
23. Personally Demanding Situations
24. Attentive Job Demands
25. Vigilant/Discriminating Work Activities
26. Structured versus Unstructured Work Activities

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[1] Taken from Lloyd D. Marquardt and Ernest J. McCormick, *The Job Dimensions Underlying the Job Elements of the Position Analysis Questionnaire (PAQ) (Form B)*, prepared for Personnel and Training Research Programs, Psychological Sciences Division, Office of Naval Research, Arlington, Virginia, Reprot No. 4, June 1974 (page 23).

APPENDIX C

Instruments

Appendix C-1

Performance Analysis Inventories — Multiple Scale

Samples shown are for:

1. Aviation Boatswain's Mate-Equipment
2. Mess Management Specialist-S2 Division

PERFORMANCE ANALYSIS INVENTORY

Person being evaluated:________________________________(Striker, ABE-3, ABE-2)

Rater's name and Division:________________________________

Number of months you have been this person's supervisor:______________

Date:______________________

This form is to be used to describe the performance of persons in the ABE rating. It is based upon the activities that are typically performed or are considered important in this rating, at the E3, E4, or E5 level.

Your task is to consider each item and evaluate the person's performance compared to all others you have observed in this rate.

Here is an example:

Operating key-board devices. (Typewriters, adding machines, calculators, keypunch machines, etc.)

Fast and Almost Error Free			Satisfactory Speed and Accuracy			Slow or with Many Errors	Never Has to
7	6	5	4	3	2	1	X

If the person you are evaluating works with key-board devices, you would select and circle the number on the scale that best fits your appraisal of his performance. If he never has to work with key-board devices in his present billet, you would circle the X.

HumRRO (ONR)
January, 1976
Form M-ABE

I. USE OF TOOLS AND EQUIPMENT

1. Work produced using hand-powered non-precision tools/instruments. (Tools powered by the user to perform operations not requiring great accuracy or precision; hammers, wrenches, knives, hand grease guns, etc.)

Exceptionally Good			Satisfactory			Exceptionally Poor	Never Has to
7	6	5	4	3	2	1	X

2. Work produced using energy-powered tools to perform operations not requiring great accuracy or precision. (Electric grinders and drills, welding equipment, brazing gear, skill saw, etc.)

Exceptionally Good			Satisfactory			Exceptionally Poor	Never Has to
7	6	5	4	3	2	1	X

3. Work accomplished using handling devices. (Pouring zinc from ladles, using mechanical fingers, etc.)

Exceptionally Efficient			Satisfactory			Exceptionally Inefficient	Never Has to
7	6	5	4	3	2	1	X

4. Accurate use of measuring devices. (Micrometers, rulers, tensiometers, stop watches, etc.)

Exceptionally Accurate			Satisfactory			Exceptionally Inaccurate	Never Has to
7	6	5	4	3	2	1	X

5. Work accomplished using long-handle tools. (Mopping up fuel spills, using brooms, etc.)

Exceptionally Good			Satisfactory			Exceptionally Poor	Never Has to
7	6	5	4	3	2	1	X

6. Work accomplished with applicators. (Brushes, rags, paint rollers, etc.)

Very Efficient			Satisfactory			Very Inefficient	Never Has to
7	6	5	4	3	2	1	X

7. Using activation controls. (Hand or foot operated devices used to start, stop, or otherwise activate energy-using systems or mechanisms; buttons, levers, hand cranks, switches, etc.)

Very Good Knowledge of Procedures			Satisfactory			Very Poor Knowledge of Procedures	Never Has to
7	6	5	4	3	2	1	X

8. Using fixed setting controls. (Hand or foot operated devices with distinct positions, detents, or definite settings; declutch lever for arresting gear, mechanical lock for launching control valve, etc.)

Very Good Knowledge of Procedures			Satisfactory			Very Poor Knowledge of Procedures	Never Has to
7	6	5	4	3	2	1	X

9. Using variable setting controls. (Hand or foot operated devices that can be set at the beginning of operation, or infrequently, at any position along a scale; pressure set regulator valve, CSV, control valve for arresting gear, etc.)

Exceptionally Accurate			Satisfactory			Exceptionally Inaccurate	Never Has to
7	6	5	4	3	2	1	X

II. HAND-ARM MANIPULATIONS

10. Setting up/adjusting machines or equipment. (Adjusting, calibrating, aligning and/or setting up; adjusting cable tension, calibrating gauges, calibrating equipment for electrical read-outs, etc.)

Exceptionally Accurate			Satisfactory			Exceptionally Inaccurate	Never Has to
7	6	5	4	3	2	1	X

11. Assembling/disassembling machines or equipment, either manually or with the use of hand tools. (For example, tearing down and setting up catapult, etc.)

Exceptionally Efficient			Satisfactory			Exceptionally Inefficient	Never Has to
7	6	5	4	3	2	1	X

12. Maintaining hand-arm steadiness. (Maintaining a uniform, controlled hand-arm posture or movement; using a welding torch, soldering, etc.)

Highly Controlled, Steady			Adequate			Poorly Controlled, Unsteady	Never Has to
7	6	5	4	3	2	1	X

III. COORDINATION

13. Skill or precision in coordinating hand or foot movements with eye. (The coordination of hand and/or foot movements where the movement must be coordinated with what is seen; for example, in gauge adjustment, etc.)

Very Well Coordinated			Satisfactory			Very Poorly Coordinated	Never Has to
7	6	5	4	3	2	1	X

14. Coordination of entire body. (Activities involving extensive and often highly-practiced coordination activities of the whole body; crawling under aircraft, rigging barricade, etc.)

Exceptionally Well Coordinated			Satisfactory			Very Poorly Coordinated	Never Has to
7	6	5	4	3	2	1	X

15. Balancing. (Maintaining balance on narrow, slippery, steeply inclined or erratically moving surfaces; walking on narrow elevated plank, standing on cat walk, during underway replenishment, etc.)

Exceptionally Good			Satisfactory			Exceptionally Poor	Never Has to
7	6	5	4	3	2	1	X

IV. WORK HABITS AND PROCESSES

16. Maintaining specified work pace. (Operating catapult or arresting gear, etc.)

Exceptionally Good			Satisfactory			Exceptionally Poor	Never Has to
7	6	5	4	3	2	1	X

17. Maintaining quality of performance when working on repetitive activities. (Performance of the same physical or mental activities repeatedly, without interruption, for periods of time; hooking up, launching, etc.)

Exceptionally Good			Satisfactory			Exceptionally Poor	Never Has to
7	6	5	4	3	2	1	X

18. Maintains quality of work when performing under time pressure. (Launching and recovery, etc.)

Exceptionally Good			Satisfactory			Exceptionally Poor	Never Has to
7	6	5	4	3	2	1	X

19. The amount of supervision this person requires compared to the amount that is normally given in this rate and rating.

Needs Much Less Supervision Than Is Normal			Average			Needs Much More Supervision Than Is Normal
7	6	5	4	3	2	1

20. Interacting with supervisors. (Those personnel who have immediate responsibility for a work group; for example, leading petty officers, etc.)

Highly Effective			Satisfactory			Very Ineffective
7	6	5	4	3	2	1

21. Interacting with officers.

Very Effective			Satisfactory			Very Ineffective
7	6	5	4	3	2	1

22. Effectiveness in dealing with co-workers. (Interacting with another person; working as a member of a group, team or crew, etc.)

Very Effective			Satisfactory			Very Ineffective
7	6	5	4	3	2	1

23. Instructing. (The teaching of knowledge or skills, either in an informal or formal manner, to others.)

Highly Effective			Satisfactory			Very Ineffective	Never Has Has to
7	6	5	4	3	2	1	X

24. Communicating information verbally. (Giving information to superiors or subordinates about the job.)

Very Effective			Satisfactory			Very Ineffective
7	6	5	4	3	2	1

25. Providing supervision to other persons.

Very Effective			Satisfactory			Very Ineffective	Never Has to
7	6	5	4	3	2	1	X

26. Being reliable in work habits. (Shows up on time, stays with the job, etc.)

Very Reliable			Satisfactory			Very Unreliable
7	6	5	4	3	2	1

27. Showing initiative. (Carrying out necessary tasks without being told to, etc.)

Exceptional Amount of Initiative			Average			Exceptional Lack of Initiative
7	6	5	4	3	2	1

28. Being thorough. (Paying attention to detail, being sure that nothing is left undone, etc.)

Exceptionally Attentive			Satisfactory			Exceptionally Inattentive
7	6	5	4	3	2	1

29. Reasoning in situations where procedures are not completely specified. (Deciding on the most appropriate action to take in non-routine situations, using common sense to complete tasks, applying principles that have been learned to solve problems, etc.)

Exceptionally Good			Satisfactory			Exceptionally Poor
7	6	5	4	3	2	1

30. Planning and scheduling. (Planning work activities, scheduling own work and work of others, anticipating future events and their requirements, etc.)

Exceptionally Reliable			Satisfactory			Exceptionally Unreliable
7	6	5	4	3	2	1

31. Estimating time to complete some activity. (Time required for future work activities; judging the amount of time to make a delivery, estimating the time required to service a worn machine part or piece of equipment, judging the length of time required to set up a lathe, etc.)

Exceptionally Accurate			Satisfactory			Exceptionally Inaccurate	Never Has to
7	6	5	4	3	2	1	X

32. Following fixed procedures when required as part of task. (Launching and recovery activities, etc.)

Never or Almost Never Deviates From Set Procedures			Sometimes Deviates			Practically Always Deviates From Set Procedures
7	6	5	4	3	2	1

33. Quality or rate of performance when working under distractions. (Interruptions or disturbances of any kind.)

Performs Much Better Than Average Person Under Distraction			Average			Performs Much Worse Than Average Person Under Distraction
7	6	5	4	3	2	1

34. Getting job information by reading written materials. (Launching bulletins, manuals, service charges, etc.)

Exceptionally Good			Satisfactory			Exceptionally Poor
7	6	5	4	3	2	1

35. Accuracy in getting job information that is given in numbers. (Materials which deal with quantities or amounts; PMS board, etc.)

Exceptionally Accurate			Satisfactory			Exceptionally Inaccurate	Never Has to
7	6	5	4	3	2	1	X

36. Doing arithmetic which involves addition, subtraction, multiplication, division or requires use of fractions, decimals, percentages, etc.

Exceptionally Accurate			Satisfactory			Very Inaccurate	Never Has to
7	6	5	4	3	2	1	X

37. Remembering information for a brief period of time. (Console recorder, launch valve strobe timer readings, steam pressures, etc.)

Very Reliable			Satisfactory			Very Unreliable
7	6	5	4	3	2	1

38. Showing responsibility for material goods, equipment, etc. (Attention to factors that can result in waste, loss, or damage of equipment or materials.)

Very Reliable			Satisfactory			Very Unreliable
7	6	5	4	3	2	1

39. Observing safety precautions on the job.

Very Reliable			Satisfactory			Very Unreliable
7	6	5	4	3	2	1

40. Enforcing safety precautions on the part of others.

Very Reliable			Satisfactory			Very Unreliable
7	6	5	4	3	2	1

41. Being aware of and alert to the condition/quality of equipment, material or weapon systems. (For example, condition of components in catapult and recovery gear, etc.)

Exceptionally Aware			Satisfactory			Exceptionally Unaware
7	6	5	4	3	2	1

42. Being accurate in transcribing. (Copying or posting data or information for later use; water brake readings, fluid history reports, etc.)

Exceptionally Accurate		Satisfactory			Very Inaccurate		Never Has to
7	6	5	4	3	2	1	X

43. Being thorough or complete in compiling data. (Gathering and arranging information or data in some meaningful order or form; for example, listing maintenance work for yard and shipboard personnel, etc.)

Exceptionally Complete		Satisfactory			Exceptionally Incomplete		Never Has to
7	6	5	4	3	2	1	X

44. Giving signals. (Communicating by some type of signal; hand signals, whistles, etc.)

Very Reliable and Accurate		Satisfactory			Very Unreliable or Inaccurate		Never Has to
7	6	5	4	3	2	1	X

45. Understanding and responding to signals. (Hand signals, whistles, lights, etc.)

Very Reliable and Accurate		Satisfactory			Very Unreliable or Inaccurate	
7	6	5	4	3	2	1

V. OBTAINING AND OBSERVING JOB RELEVANT INFORMATION

46. Getting job information from pictures. (Pictures or picture-like materials used as sources of information; drawings in manuals, blueprints, etc.)

Exceptionally Good		Satisfactory			Exceptionally Poor		Never Has to
7	6	5	4	3	2	1	X

47. Getting job information from visual displays. (Dials, gauges, signal lights, etc.)

Exceptionally Good		Satisfactory				Exceptionally Poor	Never Has to
7	6	5	4	3	2	1	X

48. Accuracy in getting job information with measuring devices. (Rulers, micrometers, tensiometors, etc.)

Exceptionally Accurate		Satisfactory				Exceptionally Inaccurate	Never Has to
7	6	5	4	3	2	1	X

49. Obtaining job information by attending to spoken orders, requests or verbal instructions.

Exceptionally Attentive		Satisfactory				Exceptionally Inattentive
7	6	5	4	3	2	1

50. Being sensitive to events or circumstances that change the job situation. (Movement of aircraft, movement of personnel, etc.)

Exceptionally Sensitive		Satisfactory				Exceptionally Insensitive
7	6	5	4	3	2	1

51. Obtaining job information by attending to sounds or patterns of sounds. (For example, malfunction in arresting gear, etc.)

Exceptionally Attentive		Satisfactory				Exceptionally Inattentive	Never Has
7	6	5	4	3	2	1	X

52. Being sensitive to changes in temperature, moisture or pressure that can be detected by touching. (Hot components such as launching valves, bearings, etc.)

Exceptionally Attentive		Satisfactory				Exceptionally Inattentive	Never Has to
7	6	5	4	3	2	1	X

53. Obtaining job information by seeing differences using far vision. (Deck edge operator, aircraft identification to determine correct settings for arresting gear, etc.)

Exceptionally Good		Satisfactory				Exceptionally Poor	Never Has to
7	6	5	4	3	2	1	X

54. Attending to differences in color. (Differentiating or identifying objects, materials, or details on the basis of color; for example, indicating lights, etc.)

Exceptionally Attentive		Satisfactory				Exceptionally Inattentive	Never Has to
7	6	5	4	3	2	1	X

55. Being vigilant in observing continually changing events. (Continually watching frequently changing dials and gauges, aircraft that are landing, etc.)

Exceptionally Observant		Satisfactory				Exceptionally Non-Observant	Never Has to
7	6	5	4	3	2	1	X

56. Being vigilant in observing infrequent events. (For example, observing instrument panel to identify infrequent change from "normal", etc.)

Exceptionally Observant		Satisfactory				Exceptionally Non-Observant	Never Has to
7	6	5	4	3	2	1	X

PERFORMANCE ANALYSIS INVENTORY

Person being evaluated:____________________________________ (Circle one: Striker, MS-3, MS-2)

Rater's name and Division:____

Number of months you have been this person's supervisor:___________________

Date:____________________________________

This form is to be used to describe the performance of persons in the MS rating. It is based upon the activities that are typically performed or are considered important in this rating, at the E3, E4, or E5 level.

Your task is to consider each item and evaluate the person's performance compared to all others you have observed in this rate.

Here is an example:

Operating key-board devices. (Typewriters, adding machines, calculators, keypunch machines, etc.)

Fast and Almost Error Free			Satisfactory Speed and Accuracy			Slow or with Many Errors	Never Has to
7	6	5	4	3	2	1	X

If the person you are evaluating works with key-board devices, you would select and circle the number on the scale that best fits your appraisal of his performance. If he never has to work with key-board devices in his present billet, you would circle the X.

HumRRO (ONR)
January, 1976
Form M-MS S2 Div

I. USE OF TOOLS AND EQUIPMENT

1. Work produced using hand-powered non-precision tools/instruments. (Tools powered by the user to perform operations not requiring great accuracy or precision; knives, paddles, spatulas, etc.)

Exceptionally Good			Satisfactory			Exceptionally Poor	Never Has to
7	6	5	4	3	2	1	X

2. Work accomplished using handling devices. (Tongs, ladles, dippers, etc., used for moving or handling objects and materials.)

Exceptionally Efficient			Satisfactory			Exceptionally Inefficient	Never Has to
7	6	5	4	3	2	1	X

3. Accurate use of measuring devices. (Measuring cups, tablespoons, scales, etc.)

Exceptionally Accurate			Satisfactory			Exceptionally Inaccurate	Never Has to
7	6	5	4	3	2	1	X

4. Work accomplished using long-handle tools. (Brooms, mops, etc.)

Exceptionally Good			Satisfactory			Exceptionally Poor	Never Has to
7	6	5	4	3	2	1	X

5. Using activation controls. (Hand or foot operated devices used to start, stop, or otherwise activate energy-using systems or mechanisms; hand clutch on mixing machine, hand wheel on tilt kettle, etc.)

Very Good Knowledge of Procedures			Satisfactory			Very Poor Knowledge of Procedures	Never Has to
7	6	5	4	3	2	1	X

II. HAND/ARM MANIPULATIONS

6. Thoroughness, speed, or skill required in manually modifying materials. (Using hands directly to form or otherwise modify materials or products; kneading dough by hand, molding a meat loaf, stuffing peppers, etc.)

Exceptionally Good		Satisfactory			Exceptionally Poor		Never Has to
7	6	5	4	3	2	1	X

7. Manually controlling or guiding materials being processed. (Meat slicing, hamburger molding machine, etc.)

Exceptionally Good		Satisfactory			Exceptionally Poor		Never Has to
7	6	5	4	3	2	1	X

III. WORK HABITS AND PROCESSES

8. Maintains quality of work when performing under time pressure. (Having meals ready in mess, last minute changes in menu, etc.)

Exceptionally Good		Satisfactory				Exceptionally Poor	Never Has to
7	6	5	4	3	2	1	X

9. The amount of supervision this person requires compared to the amount that is normally given in this rate and rating.

Needs Much Less Supervision Than Is Normal			Average			Needs Much More Supervision Than Is Normal
7	6	5	4	3	2	1

10. Interacting with supervisors. (Those personnel who have immediate responsibility for a work group; for example, leading petty officers, etc.)

Very Effective		Satisfactory				Very Ineffective
7	6	5	4	3	2	1

11. Interacting with officers.

Very Effective Satisfactory Very Ineffective

7 6 5 4 3 2 1

12. Effectiveness in dealing with co-workers. (Interacting with another person; working as a member of a group, team or crew, etc.)

Very Effective Satisfactory Very Ineffective

7 6 5 4 3 2 1

13. Instructing. (The teaching of knowledge or skills to trainees/apprentices, either in an informal or on-the-job situation or in a more formal class situation.)

Very Effective Satisfactory Very Ineffective Never Has to

7 6 5 4 3 2 1 X

14. Communicating information verbally. (Giving information to superiors or subordinates about the job.)

Very Effective Satisfactory Very Ineffective

7 6 5 4 3 2 1

15. Providing supervision to other persons.

Very Effective Satisfactory Very Ineffective Never Has to

7 6 5 4 3 2 1 X

16. Being reliable in work habits. (Shows up on time, stays with the job, etc.)

Very Reliable Satisfactory Very Unreliable

7 6 5 4 3 2 1

17. Showing initiative. (Carrying out necessary tasks without being told to.)

Exceptional Amount Of Initiative Average Exceptional Lack Of Initiative

7 6 5 4 3 2 1

18. Being thorough. (Paying attention to detail, being sure that nothing is left undone, etc.)

Exceptionally Attentive			Satisfactory			Exceptionally Inattentive
7	6	5	4	3	2	1

19. Reasoning in situations where procedures are not completely specified. (Deciding on the most appropriate action to take in non-routine situations, using common sense to complete tasks, applying principles that have been learned to solve problems, etc.)

Exceptionally Good			Satisfactory			Exceptionally Poor
7	6	5	4	3	2	1

20. Planning. (Planning work activities, own work, work of others, anticipating future events and their requirements, etc.)

Exceptionally Reliable			Satisfactory			Exceptionally Unreliable
7	6	5	4	3	2	1

21. Estimating time to complete some activity.

Exceptionally Accurate			Satisfactory			Exceptionally Inaccurate	Never Has to
7	6	5	4	3	2	1	X

22. Following fixed procedures when required as part of task. (Following specific set procedures or routines in order to obtain satisfactory outcomes; following recipes, PMS, etc.)

Never or Almost Never Deviates From Set Procedures			Satisfactory			Practically Always Deviates From Set Procedures
7	6	5	4	3	2	1

23. Quality or rate of performance when working under distractions. (Interruptions or disturbances of any kind.)

Performs Much Better Than Average Person Under Distraction			Average			Performs Much Worse Than Average Person Under Distraction
7	6	5	4	3	2	1

24. Getting job information by reading written materials. (Kitchen work sheet, recipe cards, etc.)

Exceptionally Good			Satisfactory			Exceptionally Poor
7	6	5	4	3	2	1

25. Accuracy in getting job information that is given in numbers. (For example, maintaining food service records, etc.)

Exceptionally Accurate			Satisfactory			Exceptionally Inaccurate	Never Has to
7	6	5	4	3	2	1	X

26. Doing arithmetic which involves addition, subtraction, multiplication, division or requires use of fractions, decimals, and percentages, etc.)

Exceptionally Accurate			Satisfactory			Exceptionally Inaccurate	Never Has to
7	6	5	4	3	2	1	X

27. Remembering information for a brief period of time.

Very Reliable			Satisfactory			Very Unreliable
7	6	5	4	3	2	1

28. Showing responsibility for material goods, equipment, etc. (Attention to factors that can result in waste, loss, or damage of equipment or materials.)

Very Reliable			Satisfactory			Very Unreliable
7	6	5	4	3	2	1

29. Observing safety precautions on the job.

Very Reliable			Satisfactory			Very Unreliable
7	6	5	4	3	2	1

30. Enforcing safety precautions on the part of others.

Very Reliable			Satisfactory			Very Unreliable
7	6	5	4	3	2	1

IV. OBTAINING AND OBSERVING JOB RELEVANT INFORMATION

31. Accuracy in getting job information with measuring devices. (Scales, thermometers, pressure gauges on steamers, etc. used to obtain visual information about physical measurements.)

Exceptionally Accurate			Satisfactory			Exceptionally Inaccurate	Never Has to
7	6	5	4	3	2	1	X

32. Obtaining job information by observing materials as they are being worked with or modified. (Parts, materials, objects, etc., which are sources of information when being modified, worked on, or otherwise processed; kneading dough, inspecting for spoilage, etc.)

Exceptionally Good			Satisfactory			Exceptionally Poor	Never Has to
7	6	5	4	3	2	1	X

33. Observing or inspecting products, objects, materials, etc. in terms of established standards. (Either one's own work products or products of others; identifying spoilage, judging appearance of food, freshness of fruits, vegetables, etc.)

Exceptionally Good			Satisfactory			Exceptionally Poor	Never Has to
7	6	5	4	3	2	1	X

34. Obtaining job information by attending to spoken orders, requests or verbal instructions.

Exceptionally Attentive			Satisfactory			Exceptionally Inattentive
7	6	5	4	3	2	1

35. Being sensitive to changes in temperature, moisture, or pressure that can be detected by touching. (Temperature, texture of bread dough, texture and moisture of meat, etc.)

Exceptionally Attentive			Satisfactory			Exceptionally Inattentive	Never Has to
7	6	5	4	3	2	1	X

36. Obtaining job information by smelling. (Odors which the worker needs to smell in order to perform his job; burning foods, rancid foods, etc.)

Exceptionally Good			Satisfactory			Exceptionally Poor	Never Has to
7	6	5	4	3	2	1	X

37. Obtaining job information by tasting. (Bitter, sour, sweet, or salty qualities, etc.)

Exceptionally Good			Satisfactory			Exceptionally Poor	Never Has to
7	6	5	4	3	2	1	X

38. Being vigilant in observing infrequent events. (For example, to avoid overcooking, etc.)

Exceptionally Observant			Satisfactory			Exceptionally Non-observant	Never Has to
7	6	5	4	3	2	1	X

39. Estimating speed of processes or events. (On-going processes or a series of events while they are taking place; for example, time required for vegetables to finish cooking, etc.)

Exceptionally Accurate			Satisfactory			Exceptionally Inaccurate	Never Has to
7	6	5	4	3	2	1	X

Appendix C-2

Performance Analysis Inventory - Common Scale

Sample Shown Is For Storekeeper

PERFORMANCE ANALYSIS INVENTORY

Person being evaluated:____(Striker, SK-3, SK-2)

Rater's name and Division:____

Number of months you have been this person's supervisor:____________________

Date:_____________________________

This form is to be used to describe the performance of persons in the SK rating. It is based upon the activities that are typically performed or are considered important in this rating, at the E3, E4, or E5 level.

Your task is to consider each item and evaluate the person's performance compared to all others you have observed in this rate. For each item, select the phrase from the list below that best describes the person. Write the number of the phrase in the box next to the item.

7 Among the very best I've ever seen

6 Better than most I have seen

5 Somewhat above average

4 Average

3 Somewhat below average

2 Poorer than most I have seen

1 Among the very worst I've ever seen

If the person never has to perform the activity in his present billet record an "X" in the box.

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January, 1976
Form C-SK

7	Among the very best I've ever seen
6	Better than most I have seen
5	Somewhat above average
4	Average
3	Somewhat below average
2	Poorer than most I have seen
1	Among the very worst I've ever seen
X	Never has to

I. USE OF TOOLS AND EQUIPMENT

☐ 1. Operating key-board devices. (Typewriters, adding machines, keypunch machines, etc.)

☐ 2. Effective use of powered mobile equipment (Fork lifts, pallet type trucks, etc.)

II. HAND/ARM MANIPULATIONS

☐ 3. Care, speed or thoroughness in arranging/positioning objects, materials, etc. in a specific position or arrangement. (Stocking shelves, keeping stocks secure, keeping heavy and light things separated, etc.)

☐ 4. Speed or thoroughness in physical handling. (Physically handling objects or materials, either manually or with use of aiding devices; in certain warehousing activities, loading/unloading conveyor belts, etc. when there is little requirement for careful positioning or arrangement of objects.)

III. WORK HABITS AND PROCESSES

☐ 5 Meeting a schedule for a continuing cycle of activities. (Performance of a sequence or schedule of work activities which typically occurs on a weekly, daily, or hourly basis and which typically allows the worker some freedom of action so long as he meets a schedule; reordering, issuing, preparing reports on obligations and consumption of expendables, etc.)

☐ 6. The amount of supervision this person requires compared to the amount that is normally given in this rate and rating.

☐ 7. Interacting with supervisors. (Those personnel who have immediate responsibility for a work group; for example, leading petty officers, etc.)

☐ 8. Interacting with officers.

7	Among the very best I've ever seen
6	Better than most I have seen
5	Somewhat above average
4	Average
3	Somewhat below average
2	Poorer than most I have seen
1	Among the very worst I've ever seen
X	Never has to

☐ 9. Effectiveness in dealing with co-workers. (Interacting with another person; working as a member of a group, team or crew, etc.)

☐ 10. Instructing. (The teaching of knowledge or skills to trainees/apprentices, either in an informal or on-the-job situation or in a more formal class situation.

☐ 11. Communicating information verbally. (Giving information to superiors or subordinates about the job, etc.)

☐ 12. Providing supervision to other persons.

☐ 13. Being reliable in work habits. (Shows up on time, stays with the job, etc.)

☐ 14. Showing initiative. (Carrying out necessary tasks without being told to, etc.)

☐ 15. Being thorough. (Paying attention to detail, being sure that nothing is left undone, etc.)

☐ 16. Reasoning in situations where procedures are not completely specified. (Deciding on the most appropriate action to take in non-routine situations, using common sense to complete tasks, applying principles that have been learned to solve problems, etc.)

☐ 17. Planning. (Planning work activities, own work, work of others, anticipating future events and their requirements, etc.)

☐ 18. Estimating time to complete some activity.

7	Among the very best I've ever seen
[illegible]	Better than most I have seen
5	Somewhat above average
4	Average
3	Somewhat below average
2	Poorer than most I have seen
1	Among the very worst I've ever seen
X	Never has to

☐ 19. Following fixed procedures when required as part of task. (Following specific set procedures or routines in order to obtain satisfactory outcomes; maintaining stock record cards, OPTAR reports, etc.)

☐ 20. Quality or rate of performance when working under distractions. (Interruptions or disturbances of any kind.)

☐ 21. Getting job information by reading written materials. (NAVSUP, NAVSO publications, etc.)

☐ 22. Accuracy in getting job information that is given in numbers. (Financial records, COSAL, etc.)

☐ 23. Doing arithmetic which involves addition, subtraction, multiplication, division or requires the use of fractions, decimals, and percentages, etc.)

☐ 24. Remembering information for a brief period of time.

☐ 25. Showing responsibility for material goods, equipment, etc. (Attention to factors that can result in waste, loss, or damage of equipment or materials, etc.)

☐ 26. Observing safety precautions on the job.

☐ 27. Enforcing safety precautions on the part of others.

☐ 28. Estimating weight, number, volume of objects without direct measurement. (For example, weight of pallets to be picked up with fork lift, etc.)

7	Among the very best I've ever seen
6	Better than most I have seen
5	Somewhat above average
4	Average
3	Somewhat below average
2	Poorer than most I have seen
1	Among the very worst I've ever seen
X	Never has to

☐ 29. Being accurate in transcribing (Copying or posting data or information for later use; OPTAR records, stock issue records, etc.)

☐ 30. Being thorough or complete in compiling data. (Gathering and arranging information or data in some meaningful order or form; end of month report, financial records, ACCESS, etc.)

☐ 31. Coding/decoding. (Coding information or converting coded information back to its original form; repair parts codes, billing codes, status codes, etc.)

IV. OBTAINING AND OBSERVING JOB RELEVANT INFORMATION

☐ 32. Getting job information from pictures. (Pictures or picture-like materials used as sources of information; afloat shopping guide, GSA catalogs, etc.)

☐ 33. Getting job information from visual displays. (For example, microfiche, etc.)

☐ 34. Obtaining job information by attending to spoken orders, requests or verbal instructions. (Verbal instructions to issue stock, instructions for typing requisitions, etc.)

Appendix C-3

Task Proficiency Inventories

Samples Shown Are For Pay Grade E4 in:

1. Aviation Boatswain's Mate-Equipment
2. Mess Management Specialist-S2 Division

TASK PROFICIENCY INVENTORY

Person being evaluated:____________________________(Striker, ABE-3, ABE-2)

Rater's name and Division:_____________________________________

Number of months you have been this person's supervisor:____________

Date:____________________________

This form is to be used to describe the performance of persons in the ABE rating. It is based upon the activities that are typically performed or are considered important in this rating, at the E3, E4, or E5 level.

Your task is to consider each item and evaluate the person's performance compared to all others you have observed in this rate.

Here is an example:

☐ Operating key-board devices. (Typewriters, adding machines, calculators, keypunch machines, etc.)

If the person you are evaluating works with key-board devices, you would select the number from the scale below that best fits your appraisal of his performance and write that number in the box next to the item. If he never has to work with key-board devices in his present billet, you would put an X in the box.

Very Effective			Average			Very Ineffective	Never Has to
7	6	5	4	3	2	1	X

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Form M-S S2 Div

Very Effective			Average			Very Ineffective	Never Has to
7	6	5	4	3	2	1	X

☐ 1. Participating in field days, sweep downs, etc.

☐ 2. Painting work spaces, etc.

☐ 3. Inspecting spaces for safety, cleanliness, etc.

☐ 4. Assigning personnel to work.

☐ 5. Picking up/turning in tools, equipment, and supplies.

☐ 6. Performing dye penetrant test.

☐ 7. Greasing equipment.

☐ 8. Replacing gaskets and seals in equipment (pumps, valves, etc.).

☐ 9. Replacing packing in pistons/cylinders.

☐ 10. Measuring throat depth wear on sheaves.

☐ 11. Checking sound powered phones for proper operation.

☐ 12. Removing and replacing packing glands.

☐ 13. Participating in "hang-fire" drills.

☐ 14. Removing/replacing gauges (hydraulic, pneumatic, steam).

☐ 15. Bleeding air from hydraulic system.

☐ 16. Building up barricades.

Very Effective			Average			Very Ineffective	Never Has to
7	6	5	4	3	2	1	X

☐ 17. Applying preservatives to cables (CDPS, purchase cables, bridles, etc.).

☐ 18. Cleaning hydraulic filters.

☐ 19. Stowing/breaking out parts/equipment.

☐ 20. Rigging the barricade.

☐ 21. Changing bridle arrestor straps.

☐ 22. Replacing "O" rings in valves/cylinders.

☐ 23. Painting safety markings on flight deck.

☐ 24. Repacking the retract valve.

☐ 25. Maintaining logs/records (catapult, flight deck, fuels, etc.).

☐ 26. Participating in working parties.

☐ 27. Functionally checking catapults by firing no-loads.

☐ 28. Ensuring safety lines are in place during no-load firings.

☐ 29. Changing purchase cable on "AG" engines (re-reeve).

☐ 30. Safety wiring equipment/gear/switches.

☐ 31. Measuring slipper wear.

Very Effective			Average			Very Ineffective	Never Has to
7	6	5	4	3	2	1	X

☐ 32. Inspecting components of water brake cylinder (chock ring, etc.)

☐ 33. Changing zinc anodes in water cooling systems (fluid coolers).

☐ 34. Breaking out bridles, T-bars, etc.

☐ 35. Removing broken bolts/studs from equipment.

☐ 36. Installing cables in retraction engine (re-reeve).

☐ 37. Taking cylinder elongation readings.

☐ 38. Replacing grease in automatic lubrication system.

☐ 39. Testing arresting gear (AG) cable sockets.

☐ 40. Removing/replacing fair lead sheaves.

TASK PROFICIENCY INVENTORY

Person being evaluated: ______________________________ (MS3 - Sec. 2)

Rater's name and Division: ____

Number of months you have been this person's supervisor: ______________

Date: ______________________________

This form is to be used to describe the performance of persons in the MS rating. It is based upon the activities that are typically performed or are considered important in this rating, at the E3, E4, or E5 level.

Your task is to consider each item and evaluate the person's performance compared to all others you have observed in this rate.

Here is an example:

☐ Operating key-board devices. (Typewriters, adding machines, calculators, keypunch machines, etc.)

> *If the person you are evaluating works with key-board devices, you would select the number from the scale below that best fits your appraisal of his performance and write that number in the box next to the item. If he never has to work with key-board devices in his present billet, you would put an X in the box.*

Very Effective			Average			Very Ineffective	Never Has to
7	6	5	4	3	2	1	X

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January, 1976
Form M-S S2 Div

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Very Effective			Average			Very Ineffective	Never Has to
7	6	5	4	3	2	1	X

☐ 1. Making personnel assignments.

☐ 2. Ensuring work assigned to subordinates is completed.

☐ 3. Assigning work priorities.

☐ 4. Defrosting/cleaning/sanitizing freezers, refrigerators, or reefers.

☐ 5. Preparing gravies.

☐ 6. Preparing sauces.

☐ 7. Preparing dried/dehydrated foods.

☐ 8. Drawing food items for preparation.

☐ 9. Swabbing decks.

☐ 10. Maintaining logs (pass down log (PDL) etc.).

☐ 11. Cleaning/refilling deep fat fryer.

☐ 12. Determining if food is sufficiently cooked.

☐ 13. Loading/unloading ovens.

☐ 14. Preparing meat/seafood/poultry for cooking.

☐ 15. Baking meat/seafood.

Very Effective			Average			Very Ineffective	Never Has to
7	6	5	4	3	2	1	X

☐ 16. Barbecuing meat/seafood/poultry.

☐ 17. Oven-frying meat/seafood/poultry.

☐ 18. Keeping meat/seafood/poultry at a simmer.

☐ 19. Deep fat frying meat/seafood/poultry.

☐ 20. Stewing meat/seafood/poultry.

☐ 21. Grilling meat/seafood/poultry.

☐ 22. Keeping vegetables/fruits at a simmer.

☐ 23. Preparing/cooking eggs.

☐ 24. Preparing/cooking cereal.

☐ 25. Preparing ingredients (measuring/reconstituting/mixing/etc.).

☐ 26. Operating electrically controlled food preparation equipment.

☐ 27. Using/complying with recipe cards.

☐ 28. Setting up serving line (S).

☐ 29. Sweeping decks.

☐ 30. Participating in field days, sweepdowns, etc.

☐ 31. Cleaning/sanitizing food preparation and serving line areas.

Very Effective			Average			Very Ineffective	Never Has to
7	6	5	4	3	2	1	X

☐ 32. Cleaning/sanitizing food preparation and serving line equipment.

☐ 33. Disposing of garbage and trash.

☐ 34. Cleaning storage and receiving areas.

☐ 35. Disposing of unusable subsistence supplies.

☐ 36. Processing poultry (thaw/bone/roll/cut/tie).

☐ 37. Processing meats (thaw/bone/roll/cut/tie).

☐ 38. Frying meat/seafood/poultry.

☐ 39. Roasting meat/seafood/poultry.

☐ 40. Sauteing meat/seafood/poultry.

APPENDIX D

MATRIX OF PAI ITEMS BY SECTION BY NAVY JOB

PERFORMANCE ANALYSIS INVENTORY ITEMS

	ABE	ABF	ABH	AO	EM	HT	IC	MS-S2	MS-S5	SK
I. USE OF TOOLS & EQUIPMENT										
1. Hand-powered precision						1				
2. Energy-powered precision				1	1	2	1			
3. Hand-powered non-precision	1	1	1	2	2	3	2	1		
4. Energy-powered non-precision	2		2	3	3	4	3			
5. Handling devices	3							2	1	
6. Drawing						5				
7. Measuring devices	4	2				6	4	3	2	
8. Long-handle	5								4	
9. Applicators	6	3	3							
10. Activation	7	4	4	4			5	5		
11. Fixed setting	8		5	5	4		6			
12. Variable setting	9			6	5	7	7			
13. Keyboard devices					6				3	1
14. Hand, non-continuous		5	6		7					
15. Hand, continuous			7							
16. Foot, non-continuous			8		8					
17. Man-moved mobile			9							
18. Powered mobile			10	7						2
19. Operating equipment			11							
II. HAND/ARM MANIPULATIONS										
20. Adjusting machines	10				9	8	8			
21. Manually modifying						9		6	4	
22. Manually guiding						10		7		
23. Assemble/disassemble	11	6		8	10	11	9			
24. Arranging/positioning				9						3
25. Physical handling			12	10		12				4
26. Finger manipulation							10			
27. Hand/arm steadiness	12		13		11	13	11			

PERFORMANCE ANALYSIS INVENTORY ITEMS (Continued)

	ABE	ABF	ABH	AO	EM	HT	IC	MS-S2	MS-S5	SK
III. COORDINATION										
28. Coordination with eye	13			11	12	14	12			
29. Coordination - body	14		14						5	
30. Balancing	15	7	15			15			6	
IV. WORK HABITS & PROCESSES										
31. Maintaining work pace	16		16	12						
32. Maintaining repetitive	17			13						
33. Maintaining cycled		8	17				13			5
34. Time pressure	18	9	18	14	13	16	14	8	7	
35. Supervision requirements	19	10	19	15	14	17	15	9	8	6
36. Interaction-supervisor	20	11	20	16	15	18	16	10	9	7
37. Interaction-officers	21	12	21	17	16	19	17	11	10	8
38. Interaction-co-workers	22	13	22	18	17	20	18	12	11	9
39. Instructing	23	14	23	19	18	21	19	13	12	10
40. Communicating	24	15	24	20	19	22	20	14	13	11
41. Supervision-others	25	16	25	21	20	23	21	15	14	12
42. Reliable	26	17	26	22	21	24	22	16	15	13
43. Initiative	27	18	27	23	22	25	23	17	16	14
44. Thorough	28	19	28	24	23	26	24	18	17	15
45. Reasoning	29	20	29	25	24	27	25	19	18	16
46. Planning	30	21	30	26	25	28	26	20	19	17
47. Estimating time	31	22	31	27	26	29	27	21	20	18
48. Fixed procedure	32	23	32	28	27	30	28	22	21	19
49. Distractions	33	24	33	29	28	31	29	23	22	20
50. Reading	34	25	34	30	29	32	30	24	23	21
51. Numbers	35	26	35	31	30	33	31	25	24	22
52. Arithmetic	36	27	36	32	31	34	32	26	25	23
53. Short-term memory	37	28	37	33	32	35	33	27	26	24
54. Responsibility	38	29	38	34	33	36	34	28	27	25
55. Safety precautions	39	30	39	35	34	37	35	29	28	26
56. Enforcing safety	40	31	40	36	35	38	36	30	29	27
57. Alert to condition	41	32	41	37	36		37			
58. Estimating weight		33	42						30	28

PERFORMANCE ANALYSIS INVENTORY ITEMS (Continued)

	ABE	ABF	ABH	AO	EM	HT	IC	MS-S2	MS-S5	SK
IV. WORK HABITS & PROCESSES (Cont'd)										
59. Estimating size			43			39				
60. Transcribing	42	34			37		38			29
61. Compiling	43				38		39			30
62. Coding										31
63. Analyzing					39					
64. Giving signals	44									
65. Understanding signals	45									
66. Serving									31	
V. OBTAINING & OBSERVING JOB-RELEVANT INFORMATION										
67. Pictures	46	35	44		40	40	40			32
68. Templates			45			41				
69. Visual displays	47	36	46	38	41		41			33
70. Information-measuring devices	48	37			42	42	42			
71. Information-modified		38		39	43	43		32	32	
72. Observing/inspecting		39		40		44	43	33	33	
73. Spoken	49	40	47	41	44	45	44	34	34	34
74. Events-changing job	50	41	48							
75. Sounds	51	42	49		45		45			
76. Temperature	52	43			46	46	46	35	35	
77. Smelling		44			47			36	36	
78. Tasting								37	37	
79. Far vision	53	45	50							
80. Color	54	46	51	42	48	47	47			
81. Vigilant-changing	55	47	52	43			48			
82. Vigilant-infrequent	56	48	53	44	49		49	38		
83. Depth			54	45						
84. Moving objects			55							
85. Speed of processes			56					39	38	
86. Speed-moving parts		49			50					
TOTAL	56	49	56	45	50	47	49	39	38	34

APPENDIX E

FREQUENCY OF USAGE OF SCALE VALUES UPON WHICH FIGURE 1 (A-D) ARE BASED

TABLE E-1. FREQUENCY OF USAGE OF SCALE VALUES FROM E3 DATA ON THREE RATING INSTRUMENTS (ALL NAVY JOBS, ALL ITEMS)

	PAI		TPI			PER	
SCALE VALUES	f	%	f	%	NAVY SCALE VALUE	f	%
1	420	4.14	144	4.02	1.0	1	.16
2	686	6.77	180	5.03	2.0	7	1.10
3	1306	12.88	355	9.92	2.6	12	1.88
4	2856	28.18	943	26.35	2.8	31	4.85
5	2394	23.62	851	23.78	3.0	34	5.32
6	1841	18.17	786	21.96	3.2	80	12.52
7	631	6.23	320	8.94	3.4	135	21.13
					3.6	174	27.23
Never Has To	1615		1585		3.8	142	22.22
					4.0	23	3.60
TOTAL*	10134	99.99	3579	100.00		639	100.01

---

*Totals do not include "Never Has To" perform.

TABLE E-2. FREQUENCY OF USAGE OF SCALE VALUES FROM E4 DATA ON THREE RATING INSTRUMENTS (ALL NAVY JOBS, ALL ITEMS)

	PAI		TPI			PER	
SCALE VALUES	f	%	f	%	NAVY SCALE VALUE	f	%
1	95	0.92	37	1.00	1.0	—	—
2	241	2.32	50	1.35	2.0	—	—
3	999	9.63	209	5.63	2.6	4	.46
4	2349	22.65	762	20.53	2.8	18	2.09
5	2821	27.20	909	24.50	3.0	30	3.48
6	2758	26.60	1122	30.23	3.2	47	5.45
7	1107	10.68	622	16.76	3.4	123	14.27
					3.6	292	33.88
Never Has To	683		1444		3.8	279	32.37
					4.0	69	8.01
TOTAL*	10370	100.00	3711	100.00		862	100.01

---

*Totals do not include "Never Has To" perform.

TABLE E-3. FREQUENCY OF USAGE OF SCALE VALUES FROM E5 DATA ON THREE RATING INSTRUMENTS (ALL NAVY JOBS, ALL ITEMS)

SCALE VALUES	PAI f	PAI %	TPI f	TPI %	PER NAVY SCALE VALUE	PER f	PER %
1	4	0.13	2	0.13	1.0	—	—
2	14	0.46	16	1.07	2.0	—	—
3	98	3.18	13	0.87	2.6	—	—
4	355	11.53	119	7.96	2.8	—	—
5	915	29.71	326	21.79	3.0	1	.98
6	1052	34.16	571	38.17	3.2	1	.98
7	642	20.84	449	30.01	3.4	4	3.92
					3.6	29	28.43
Never Has To	118		459		3.8	47	46.08
					4.0	20	19.61
TOTAL*	3080	100.01	1496	99.99		102	100.00

*Totals do not include "Never Has To" perform.

TABLE E-4. FREQUENCY OF USAGE OF SCALE VALUES FROM E3-E5 DATA ON THREE RATING INSTRUMENTS (ALL NAVY JOBS, ALL ITEMS)

SCALE VALUES	PAI f	PAI %	TPI f	TPI %	PER NAVY SCALE VALUE	PER f	PER %
1	519	2.20	183	2.08	1.0	1	.06
2	941	3.99	246	2.80	2.0	7	.44
3	2403	10.19	577	6.57	2.6	16	1.00
4	5560	23.58	1824	20.76	2.8	49	3.06
5	6130	25.99	2086	23.74	3.0	65	4.06
6	5651	23.96	2479	28.22	3.2	128	7.99
7	2380	10.09	1391	15.83	3.4	262	16.34
					3.6	495	30.88
Never Has To	2416		3488		3.8	468	29.20
					4.0	112	6.99
TOTAL*	23584	100.00	8786	100.00		1603	100.02

*Totals do not include "Never Has To" perform.

APPENDIX F

Appendix F-1

Items to be Deleted

TABLE F-1a. ITEMS TO BE DELETED ON THE BASIS OF FAILING TO DISCRIMINATE.

	PERFORMANCE ANALYSIS INVENTORY	TASK PERFORMANCE INVENTORY
ABE		
E3-E5	None	31, 40
ABF		
E3-E5	4	None
ABH		
E3-E5	6	None
MS-S2		
E3-E5	5	36, 37

TABLE F-1b. ITEMS TO BE DELETED ON THE BASIS OF RARELY OR NEVER BEING PERFORMED.

	PERFORMANCE ANALYSIS INVENTORY	TASK PERFORMANCE INVENTORY
ABE		
E3	None	
E4		24, 29, 31, 39
E5		51-54, 57, 58, 61
ABF		
E3	None	5, 17, 19, 23, 32, 33, 35
E4		
E5		
ABH		
E3	7	
E4		7, 9, 15, 24, 25, 27, 29, 31, 32, 34-37, 39
E5		
AO		
E3	6	47-49, 51-53
E4		19, 23-25, 29, 30, 32-35, 39, 40
E5		44, 48, 49, 51

TABLE F-1b. ITEMS TO BE DELETED ON THE BASIS OF RARELY OR NEVER BEING PERFORMED (Continued).

	PERFORMANCE ANALYSIS INVENTORY	TASK PERFORMANCE INVENTORY
MS-S2		
E3	None	51, 53
E4		22
E5		
M5-S5		
E3	3	53, 55-62, 64, 66-93
E4		7, 9, 10, 14, 23, 25, 29, 30, 34, 35, 38, 46, 47
E5		47
SK		
E3	2, 28, 30	51-56
E4		6, 7, 11-15, 20, 25, 26, 30, 32, 33, 36, 38-40
E5		46-50, 53, 55, 57-59

Appendix F-2

Items to be Combined in the
Performance Analysis Inventory (PAI) and
Task Performance Inventory (TPI)

TABLE F-2a. PAI ITEMS TO BE COMBINED BASED ON CORRELATIONS OF .90 OR GREATER & CONGRUENCE OF CONTENT.

	ABE	ABF	ABH	AO	EM	HT	IC	MS-D2	MS-D5	SK
Work produced using hand-powered non-precision tools/equipment.* Work produced using energy-powered non-precision tools/equipment.	1,2		1,2	2,3	2,3	3,4	2,3			
Work accomplished using long-handle tools. Work accomplished with applicators.	5,6									
Care, speed, or thoroughness in arranging/positioning objects, materials, etc. in a specific position or arrangement. Speed or thoroughness in physical handling.				9,10						3,4
Coordination of entire body. (Activities involving extensive and often highly-practiced coordination activities of the whole body; crawling under aircraft, rigging barricade, etc.) Balancing. (Maintaining balance on narrow, slippery, steeply inclined or erratically moving surfaces; walking on narrow areas.)			14,15							

*Examples, which accompany most items in the actual rating forms, are not included here, as they vary from one Navy job to another.

TABLE F-2a. PAI ITEMS TO BE COMBINED BASED ON CORRELATIONS OF .90 OR GREATER & CONGRUENCE OF CONTENT (Continued)

	ABE	ABF	ABH	AO	EM	HT	IC	MS-D2	MS-D5	SK
Maintaining specified work pace. Maintaining quality of performance when working on repetitive activities.	16,17			12,13						
Interacting with supervisors. Interacting with officers.	20,21	11,12	20,21	16,17	15,16	18,19	16,17	10,11	9,10	7,8
Instructing. Communicating information verbally.	23,24	14,15	23,24	19,20	18,19	21,22	19,20	13,14	12,13	10,11
Planning. (Planning work activities, own work, work of others, anticipating future events and their requirements, etc.) Estimating time to complete some activity.	30,31	21,22	30,31	26,27	25,26	28,29	26,27	20,21	19,20	17,18
Accuracy in getting job information that is given in numbers. Doing arithmetic which involves addition, subtraction, multiplication, division, or requires use of fractions, decimals, and percentages, etc.	35,36	26,27	35,36	31,32	30,31	33,34	31,32	25,26	24,25	22,23
Observing safety precautions on the job. Enforcing safety precautions on the part of others.	39,40	30,31	39,40	35,36	34,35	37,38	35,36	29,30	28,29	26,27

TABLE F-2a. PAI ITEMS TO BE COMBINED BASED ON CORRELATIONS OF .90 OR GREATER & CONGRUENCE OF CONTENT (Continued)

	ABE	ABF	ABH	AO	EM	HT	IC	MS-D2	MS-D5	SK
Getting job information from visual displays. Accuracy in getting job information with measuring devices.	47,48	36,37			41,42		41,42			
Obtaining job information by smelling. (Odors which the worker needs to smell in order to perform his job; burning foods, rancid foods, etc.) Obtaining job information by tasting. (Bitter, sour, sweet, or salty qualities, etc.)								36,37		
Being vigilant in observing continually changing events. Obtaining job information by observing materials as they are being worked with or modified.		38,47		39,43						

TABLE F-2b. TPI ITEMS TO BE COMBINED BASED ON CORRELATIONS OF .90 OR GREATER AND CONGRUENCE OF CONTENT.

ABE

8. Replacing gaskets and seals in equipment (pumps, valves, etc.).
9. Replacing packing in pistons/cylinders.

ABF

14. Replacing gaskets and seals in equipment (pumps, valves, etc.).
30. Removing/replacing pressure gauge, and lines on fuel systems.

ABH

6. Attaching/removing aircraft tiedowns.
8. Chocking aircraft/pulling chocks.

11. Directing aircraft using standard aircraft taxi signals.
13. Directing movement of aircraft during respot.

AO

5. Uncrating ordnance/equipment.
6. Stowing/breaking out ordnance.

12. Preparing ordnance/equipment for shipment (palletize, crate).
13. Stowing/breaking out parts/ordnance handling equipment.

1. Participating in field days, sweep downs, etc.
22. Cleaning ordnance (wiping off grease, etc.).

4. Inventorying ordnance.
11. Inventorying tools, equipment, and supplies.

8. Conducting general safety inspections of spaces/equipment.
26. Performing quality assurance (QA) inspection on ordnance in ready/build-up area.

MS-S2

5. Preparing gravies.
6. Preparing sauces.

21. Grilling meat/seafood/poultry.
38. Frying meat/seafood/poultry.

18. Keeping meat/seafood/poultry at a simmer.
20. Stewing meat/seafood/poultry.
40. Sauteing meat/seafood/poultry.

31. Cleaning/sanitizing food preparation and serving line areas.
32. Cleaning/sanitizing food preparation and serving line equipment.

15. Baking meat/seafood.
16. Barbecuing meat/seafood/poultry.
17. Oven-frying meat/seafood/poultry.
39. Roasting meat/seafood/poultry.

29. Sweeping decks.
30. Participating in field days, sweepdowns, etc.

36. Processing poultry (thaw/bone/roll/cut/tie).
37. Processing meats (thaw/bone/roll/cut/tie).

TABLE F-2b. TPI ITEMS TO BE COMBINED BASED ON CORRELATIONS OF .90 OR GREATER AND CONGRUENCE OF CONTENT (Continued).

MS-S5

1. Sweeping decks.
2. Disposing of garbage and trash.
3. Swabbing decks.
35. Emptying/washing trash cans.
11. Participating in field days, sweepdowns, etc.

12. Cleaning/sanitizing food preparation and serving line areas.
19. Cleaning/sanitizing food preparation and serving line equipment.

21. Serving cafeteria style lunch/dinner.
30. Serving English style breakfast/lunch.

36. Making work assignments.
37. Making personnel assignments.

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